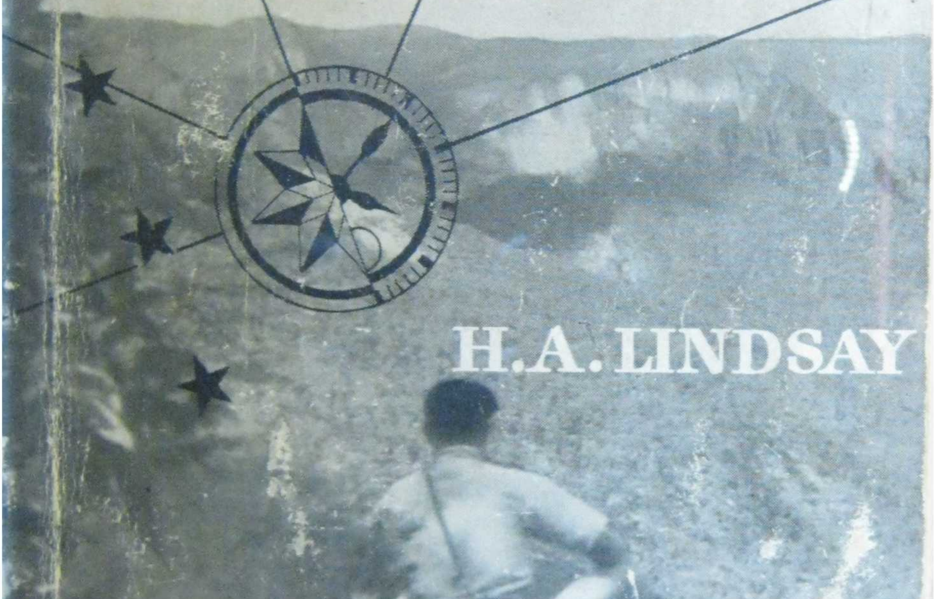
THE BUSHMAN'S HANDBOOK



H. A. LINDSAY

prehensive, practical guide for bush walkers, campers ll who wish to enjoy the pleasures of untamed nature.

With an appreciation by Ion L. Idriess

THE BUSHMAN'S HANDBOOK

A Practical Guide For Finding Water, Snaring Game, Catching Fish, Camping and General Bushcraft

By

H. A. Lindsay

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ANGUS AND ROBERTSON
SYDNEY :: LONDON
1948

*Set up, printed and bound
in Australia by
Halstead Press Pty Limited
9-19 Nickson Street, Sydney
1948*

*Registered in Australia for
transmission through the
post as a book*

In Appreciation of

THE BUSHMAN'S HANDBOOK

THIS is far and away the best book of this description I have yet read. Also, it is 100 per cent practical. The author comes of a family of famous bushmen, and his knowledge is gathered not only from his own experience but from that of many others.

The subject of the book covers practically all inland Australia, and its vast coastline. Its main purpose is to give advice on how to exist on the country, if necessary. The finding of water upon or within the ground, or in trees; the location of animal, reptile, insect, vegetable foods, and sea and fresh-water fish foods, shellfish, water-plant foods, are discussed, with a considerable amount of excellent bushcraft, clearly explained.

The author was a bushcraft instructor in the Army during the late war, and his knowledge helped many of our lads who were called upon to fight and live often under harsh conditions, in forest lands, scrub, savannah, swamp, jungle and seashore.

Happily, that war is over. And now this book should appeal to anyone with an active interest in the bush.

Those who go on a longed-for holiday that, alas, can only last for a comparatively short period, but who would love to imbibe as many of the deep inner secrets of the bush as they can in the time—to such as these, this book is a key; it can help them to understand.

PREFACE

THERE have been many attempts to put bushcraft on a scientific basis and to make it a subject that anyone interested could study. The first attempt I know of occurred shortly after the stranding of Kingsford-Smith and his crew, and the tragic deaths from thirst of Hitchcock and Anderson after their plane had made a forced landing near Wave Hill. Somebody, writing under a pen-name and evidently a good bushman, suggested through a newspaper that similar tragedies might be avoided in future if no airman were allowed to fly over the outback unless he had been trained in the fundamentals of finding food and water. If a better instructor could not be found, the writer offered to do the job himself. But nobody seemed to take the slightest notice of this very sensible idea.

In 1939, soon after the war began, many people, some of them eminent scientists, approached R.A.A.F. Headquarters with a similar suggestion. They were all thanked for the offer, but again nothing was done about it. Proposals that it be included in the training programme of the Second A.I.F. met with the same fate.

When the V.D.C. was formed in 1940, in the black days that followed Dunkirk, its leaders showed far more initiative, and included what was then known of the subject in their training. It was then that I began to collect all the information available about bushcraft, adding it to the considerable amount of knowledge which my late father had given me. In 1941 I handed this information to the then Superintendent

of Mounted Police in South Australia, Mr W. F. Johns. Being both an old soldier and a man who had spent years as a police trooper in the outback, Johns did not need to have its value stressed. He consulted the Commissioner of Police, General Leane, who was also head of the V.D.C. in South Australia, and as a result I was appointed Bushcraft Instructor to the V.D.C. But attempts to have it adopted as part of the training of the regular Army failed once more.

Things changed after Pearl Harbour. When the American armed forces arrived in Australia they wanted to be taught all they could about this country, and General Waldron told me to go right ahead. Then our own Army and Air Force became interested as the Japanese drew nearer to Australia. Rejected on medical grounds at all previous attempts to enlist, I was now allowed to join the A.I.F. and spent the rest of the war years as a bushcraft instructor. During that time practically the whole of Australia, with the exception of the Darwin and Arnhem Land areas, was covered, as well as portions of Dutch New Guinea, Torres Strait, Papua, the Trobriands, New Britain, the Solomon Islands and one corner of the vast area known as Polynesia.

Wherever I went in the course of my duties I collected additional information, tested everything out and, if it proved sound and workable, included it in the training programme. It would be most unfair, therefore, to claim to be the author of this book. The information used in it was collected from hundreds of people, drawn from all walks of life and scattered all over Australia and the adjacent islands. "Editor" would be a more correct term.

It is not possible to mention everyone who helped; the names of many have been forgotten and others prefer to remain anonymous. Among those who can be mentioned are the following:

Staffs of all Australian museums and of the Waite Institute; forestry officers, particularly Mr Brockway of Kal-

goorlie; Captain S. A. White, ornithologist, of Adelaide; the late Dr Consett Davis, whose death in a New Guinea plane crash robbed us of a promising young scientist; Dr Flecker, of Cairns; and especially Miss Gladys Carey, of Sydney University, firstly, for writing such a useful handbook as *Botany by Observation*, and secondly, for so much additional help, so willingly given.

Valuable information came also from many inspectors of game and fisheries and from scores of professional fishermen. Among the practical bushmen who assisted were the late Jack Sauerbier, Adelaide; Arthur Groom, Binnaburra, Queensland; "Bucko" McNab, Atherton, Queensland; Dick Holland, Cape York, Queensland; Bertie Jardine, Somerset, Queensland; Alf Jones, Keppoch, South Australia; Fred Knight, Narracoorte, South Australia; "Sporting Mac" McCarthey, Coorong, South Australia; George Davis, Balmoral, Victoria; "Slim" Kemp, Fremantle, Western Australia; Ted Jowett, of "anywhere in the west where a man might pick up a few pennyweight of gold"; Mick Hutton, of "anywhere along the droving tracks"; and Mrs Eleanor Babidge, of "wherever my husband happens to be working in the bush".

Among natives who helped were the late Clarence Milerum, Coorong, South Australia; the late Mrs Elizabeth Pinkie, Tatiara, South Australia; the late Doolgan, Luritja tribe, Central Australia; George Disher, Renmark, South Australia; Ted Wanyill, Kimberley, Western Australia; Corporal Tawaii Dawitta, Torres Straits Native Infantry; Constables Boori and Moeki, Royal Papuan Native Constabulary; K'Amu and P'Uaka, "pygmies" (really negritos), of Dutch New Guinea. I was also assisted by members of a family of Polynesians whose home lies in one of the few remaining unspoiled corners of the Pacific. I do not mention their names or where they live because I hope that island does remain unspoiled.

Bushcraft instructors in any of our armed forces had to be men who had always been interested in the bush. It must

be stressed that we were not theorists; we had to demonstrate the things of which we spoke; our fish traps had to catch fish, our snares had to catch game; and if we said that water could be procured in any way, we had to produce the drink of water in front of the class. If we weren't almost as good as an aborigine at the job, we couldn't hold it. Probably the best bushcraft instructors in Australia were members of 17th Battalion, V.D.C. These veterans, whose homes lie in the area of north Queensland which includes Cairns, Atherton, Mossman and Daintree, decided that they could do more than train, drill and stand on guard in case of invasion. Under Major Chargois they made an intensive study of bushcraft and then devoted their spare time to training the younger men of the A.I.F., R.A.A.F., and United States armed forces. Their work was largely unpaid and, I regret to say, taken for granted by Higher Authority, but perhaps some of the parents and wives of the men who owe a lot to the training given them by those V.D.C. men will tender the thanks which officialdom neglected. Lieutenant Nieb of the Netherlands East Indies Army and his native assistant Gabriel should also be thanked for a similar service.

All bushcraft instructors worked under a great handicap at times. We were expected to know—by some strange power of intuition, it seemed—the natural food resources of an area which we had not previously seen. Often we were given no time to carry out any research. None of us, except a few men in the V.D.C., held rank higher than that of N.C.O. No soldier need be told of the troubles of an N.C.O. who tried to carry out his job as he knew it should be done, and not as somebody with higher rank thought it should be done. Of the lack of assistance and the downright obstruction that we met sometimes, I prefer to say nothing: such things are better forgotten. In other cases we were given every assistance and our difficult position was realized, so that evened things up. And we did manage to train quite a lot of men.

PREFACE

Today, back in civilian life, we are faced with the fact hat all the information about the bush which we gathered vhile in the Army will be wasted if something isn't done about t. This book has therefore been compiled to guide those who vish to gain that knowledge of the bush and its ways which hould be part of the birthright of every Australian.

I hereby dedicate it to the memory of my father, George Lindsay, and of my uncle, David Lindsay, both of whom were etter bushmen than I shall ever be.

H. A. LINDSAY

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CHAPTER I

FINDING WATER IN SCRUB COUNTRY

THERE is nothing mysterious or marvellous about bush-craft. To become a good bushman, you master a thousand and one little tricks whose main feature is their utter simplicity—when once you have learned how they are done. You won't get very far if you accept things blindly: you must understand *why* things happen, and to do that it is necessary to learn the fundamentals of chemistry, physics, botany, geology and zoology. Elementary school text-books will teach you most of what you need.

Do not imagine that natives possess powers that are denied to civilized man. With the exception of tracking, there is nothing which we cannot learn to do quite as well as they do it. You must have an open and a receptive mind, good powers of observation, and a retentive memory. You don't have to be born in the bush to become a good bushman; many of the best pupils who passed through our hands were city lads. Of course, the *real* bushman stands head and shoulders above everyone, but only too often a man who is born in the bush shows that he can learn nothing new and forget nothing old. You can do little with the person who cannot be convinced that the young kangaroo is not born on the teat, or who persists in the belief that a green stick held in the hand will show you where to find water.

The correct mental approach to a lesson is often half the battle, and you find a perfect illustration of this point in

what is the most important part of your training—finding water. When the average civilized man, who knows nothing of the bush, finds himself stranded somewhere in the scrub he is usually under a heavy handicap because he has what we christened "the water tap outlook". In his mind he associates water with the turning of a tap, or thinks of it as something which lies in pools or runs down creeks; he cannot visualize it as existing anywhere else. As a result, he goes tramping through the bush, looking for water only in the form of streams or pools; he thus wastes his strength in useless labour and only too often fails to find what he seeks.

Contrast his actions with those of an aborigine or a good bushman. They know that you can find water in places other than creeks, wells, springs and taps on pipe-lines. Water can be drained from the roots or trunks of many of our native trees and shrubs; it lies in the distended bodies of frogs which have buried themselves under the mud of dried-up swamps and waterholes; it can be found by digging a hole a few feet deep in the right place; it pours out of many of the canes and vines to be found in the jungle; many species of bird will indicate that it is near or will lead you to it. As a result, both the good bushman and the aborigine will find water where the untrained man might die of thirst.

We can carry this illustration further. Imagine yourself transported to a patch of scrub somewhere in the outback country of the southern portion of Australia. Overhead the midsummer sun blazes from a cloudless sky; underfoot lies a soil of reddish sand in which it is hopeless to try to find water in the shape of soaks or springs. All around you, stretching to the blue horizon's rim, runs a leafy wilderness of low scrub. You have no water and your throat is parched. What should you do and, equally important, what shouldn't you do? The worst thing would be to start walking as fast as you could, unnecessarily using up your energy, and driven by a sick panic to find help in some shape or form. If an

aborigine was watching you he would probably sum up the position by saying, "White feller big feller fool!" And he would be right.

Now imagine yourself to be a good bushman, as wise in the ways of the bush as any aborigine. You look round, head and eyes moving slowly in order to miss nothing. A few hundred yards away lies a ridge, slightly higher than the surrounding country. You move towards it with unhurried, energy-saving steps, your mind quite calm and your intention being to let your eyes save your legs from a lot of useless work. On reaching the crest of the ridge you tilt the brim of your hat over your eyes to shield them from the glare and survey the scrub, looking for water-trees. Your gaze becomes fixed on one spot. Over there you can see a large, luxuriant-looking clump of water mallees, a needlebush that is bigger than usual, a banksia, or any other of our trees or shrubs whose roots will yield water. You walk towards it, still husbanding your strength by refusing to hurry. As you stroll along you break a stout green stick and trim one end to a point with your knife. What if you have no knife? If you didn't have one you wouldn't be a bushman, so we won't consider the possibility.

If the ground was very hard you would have to light a small fire, char one end of the stick slightly, scrape off the black with your knife, char and scrape again until the point was almost as hard as iron. But in this sandy soil you won't need a fire-hardened digging stick.

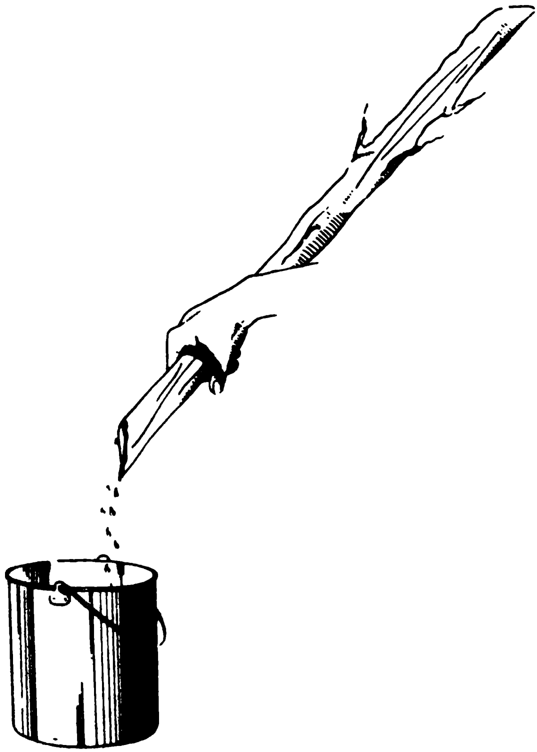
On reaching the tree or bush which your trained eye has selected, you don't root up the ground in all directions in the hope of finding a water-root by the hit-or-miss method. If it is a small tree or bush the ground will crack above each root if you push against the trunk. If it is a big tree the roots may be indicated by slight ridges in sandy soil; if the soil carries grass the course of each root is marked by lines

radiating from the trunk on which little or no grass grows; you might almost take them for trails made by meat ants.

You dig in one of these spots close to the trunk; at any depth from a few inches to a foot you will strike the root. You will know that it is a water-root as soon as you uncover it: it is never very thick, ranging from the size of your thumb to that of your wrist; its bark is smoother than that of other roots; it does not send out a lot of side branches; and it is as even in thickness as a broom handle, with little or no taper; it does not dip sharply into the ground but runs parallel to the surface.

Make a slanting cut through the root near the trunk. Grasp the free end of the root in the left hand while the right hand pushes the digging stick under it and uses it as a lever. The soil lifts and cracks as you work and the root comes up just as if it were a rope that had been buried. Usually yard after yard is uncovered until you have twenty or thirty feet; you stop only when the main root branches in many small ones. Now your knowledge of elementary botany comes into play. You know that the fine, hair-like rootlets at the tips of the main roots run in all directions through the soil, and that soil moisture enters them by osmotic pressure. This water travels through the root to the trunk, then up the trunk to the leaves. You also know that the shorter the lengths into which you cut the root, the quicker the water will run out. Using slanting cuts, you divide that long root into eighteen-inch lengths. The end that was *nearest the trunk* on each piece is placed downward to let the water drain out, because this is the way the water flows naturally. If you have a billycan or similar utensil, you stand the roots in it to drain; if you haven't, you let them drain into your mouth one at a time.

But you haven't finished with those pieces of root when the water ceases to drain from them; you can force out some additional water by putting your mouth over the end of the



DRAINING WATER FROM TREE ROOTS

root that was farthest from the trunk and blowing down it. Times beyond number, when demonstrating this trick to Army personnel (and a few times when forced to do it from thirst) I have obtained nearly a quart of water from a root about thirty feet long.

Two of the rules for collecting water from roots have been explained:

B

1. Always pick the greenest and most luxuriant-looking tree you can find.

2. Always put the end of each piece of root which was nearest the tree downward when draining out the water.

Here are the rest of the rules:

3. Avoid thick scrub: pick the trees or bushes which grow by themselves, or those on the outside of clumps.

4. Don't search for water on rocky ground: choose soft soil or sand. On rocky ground it is very hard to dig out the roots and when you do get them they are gnarled and distorted. Water won't run properly from those twisted roots.

5. Disregard the advice usually given—"Go into the hollows"—when seeking water-roots. Instead, go up on the rises, especially the sandhills, where a tree has to develop an enormous root system in order to live; naturally, the more roots you can find the more water you'll obtain.

6. The best time to get the water is at sunrise, when the tree has been collecting and storing water all night and the roots are full (turgid). The worst time is the middle of a hot, dry day.

7. The water from the roots of some species of tree has a gummy, earthy taste, but from others it is almost as good as rain-water. There is no need to sterilize it—Nature has done that for you.

8. There are only two "Don't drink it" rules; they are so simple that nobody should ever forget them. Never drink water from roots if it has a bitter or a sharp, burning taste; never drink water which runs from a root with a milky juice in it.

Let us start on an imaginary tour of part of Australia, to give some idea of the water-trees which may be found. We will start at Carnarvon, in Western Australia, work south and then east. In the scrub in this part of Western Australia you will find a wattle, very similar to a jamwood in appear-

ance, but, where the wood of the jam has a chocolate colour and smells like raspberry jam when cut, the wood of this wattle is light in colour and much softer. The leaf, like that of the jam, is long and thin, but is slightly wider and is without the very fine fluffy hairs on the edge. Though found inland as well as on the coast, it is usually called coast wattle and is the main vegetation of the coastal dunes as far down as Fremantle. It is a very good water-root tree. Inland you will find an acacia with thin, needle-like but slightly flattened leaves, quite soft to the touch, with the tip of each bent a little to one side, crochet-hook fashion. These leaves are similar to those of the familiar Geraldton wax-plant, and both are good water-trees. Farther south, and for some distance inland, you find several species of banksia; in any part of the drier regions of Australia, almost without exception, banksias will be found to be good water yielders.

From Geraldton south to Perth, through a wide strip of country stretching from the coastal dunes inland to where this type of scrub is replaced by the salmon-gums and gimlet mallee of the semi-desert, you can obtain a drink from any of the trees mentioned above.

There is only one real water-tree in the goldfields' area and it is known as *the* water-tree. To botanists it is *Grevillea nematophylla* and it has saved many a life. It looks like a small she-oak, except that its leaves are smooth like pine-needles and, whereas the fruit of the she-oak is rough, like a small pine-cone, the seed-pods of this tree are oval and are the size and colour of a roasted coffee-bean.

We will pass over the forest country of Western Australia for the time being; we are dealing with the scrub at present and a different trick is used to get a drink in the tall timber. Along the coast east of Albany the country is again semi-arid, and the water-tree is the blue mallee, whose leaves are as large as the palm of the hand and of the same grey-blue colour (glaucous) as the familiar bluegum. Inland the water-

tree is the calathamnos bush, whose flowers resemble those of a bottlebrush split lengthwise; the water is in sausage-shaped swellings on the roots. Right out in what is almost desert country there is another tree with these curious water-filled swellings on the roots; it is the kurrajong, a tree too well known to need further description.

Travelling farther east you come to the mallee scrub fringing the Nullarbor, and here you find the most famous of all our water-trees, the water mallee. To the beginner, most mallees may look alike, but it is easy to pick this one. When the bark is shed it does not flake off, as on most mallees, but comes away in long, ribbon-like strips, which may hang for months. When these strips finally fall off they lie flat on the ground, radiating from the trunk like the spokes of a wheel. During his explorations in this part of Australia my uncle, the late David Lindsay, met tribes of aborigines who, all through the dry summer months, were unable to obtain any water except what they drained from the roots of this wonderful tree. I have walked for days through similar country, doing the same thing.

After crossing the arid wastes of the Nullarbor the same water mallee is encountered, running well down into Eyre Peninsula and for some distance inland. Missing out the area of good country which follows, we start again south of the Murray mouth. Here, through a stretch of coastal sand-dunes more than a hundred miles in length, we find the boobialla, a small-leafed wattle-like tree, whose long roots are often exposed on the dunes by wind erosion. Water runs copiously from these roots when they are cut, yet, in the early days of settlement, many men suffered severely from thirst in this very area and a few died, never realizing that there was plenty of water in the roots over which they tripped and stumbled. Inland from this Coorong area, running far out into the "sunset" country of Victoria, is a sea of low scrub in which will be found many mallees whose

roots will yield water, as well as the needlebush (Hakea), easily recognized by its stiff, needle-like, dark green leaves, each with a tiny, hard black spine on the tip and a woody fruit which splits in half lengthwise to discharge the seed.

Similar conditions will be found in this sort of country over large areas of Australia. Space will not permit a more extensive list of the water-trees of Australia and, in any case, I do not claim to know them all; it is doubtful if anyone, bushman or botanist, living or dead, has ever been able to learn the names or descriptions of all our water-trees. It is a curious fact that most of our botanical handbooks contain few or no references to this very useful feature of some of our trees and plants, while one bushcraft handbook contains downright misinformation.

It is most important that you should visit the nearest area of semi-arid country and try out every species of tree and bush you meet. At first you may have to work on the trial-and-error principle, but after a time the knack will be acquired, leading up to the day when, in country which you have never visited before, carrying vegetation of species hitherto unknown to you, you will be able to say, "This looks as if it should be a good water-root tree", and find that you are often right. It is also a good way to bring home to yourself the fact that by practice alone will you master all the little tricks you must learn to become a real bushman.

But don't run away with the idea that, because you know the theory of the business and have done a bit of practical work, you will be able to get yourself a drink in any patch of scrub in Australia, especially when drought grips the country in its withering hand. There are some places, moreover, where there seem to be no water-trees whatsoever. I traversed the whole of the 100-mile belt of scrub between Exmouth Gulf and Carnarvon, Western Australia, without finding a single species whose roots would yield as much as a drop of water. There are other areas like this, too.

There is one trick, however, which may save you when all else fails, and for this, and for many other things of the kind, we must thank Norman Tindale, Ethnologist at the South Australian Museum. If you ever have to cross a really bad stretch of country, copy the desert aborigines by carrying with you a bit of good red or yellow clay about the size of a golf ball. Clay of this type can be obtained from creek banks, from the subsoil on the roots of a tree that has been blown down, from the ring of earth around an ants' nest or, as a last resort, by digging. It is important to take the clay with you—don't ever rely on finding things like that when you need them. On your journey dig up roots and, if no water runs from them, cut a short bit and get a few drops by blowing down it. Use this water to moisten a bit of your clay and turn it into a putty-like paste. Make a smooth, slanting cut on the end of a three-foot piece of root (the end which was farthest from the tree, of course), smear the clay over it, and with the ball of the thumb press it hard into the pores of the wood to seal them. Light a small fire and warm the root in it, starting near the clay seal and working towards the other end. The heat liberates the moisture from the wood and the steam pressure generated inside the root, which cannot escape through the clay, forces all this water out of the other end, just as you see it bubbling and dripping from the ends of wet or green sticks in a fire. This trick will also work with smooth, straight sticks taken from the upper limbs of many of our trees, but in this case always put the clay sealing on what was the *lower* end of the stick.

Water steamed from roots or branches has a strong gummy flavour but it is better than none.

CHAPTER II

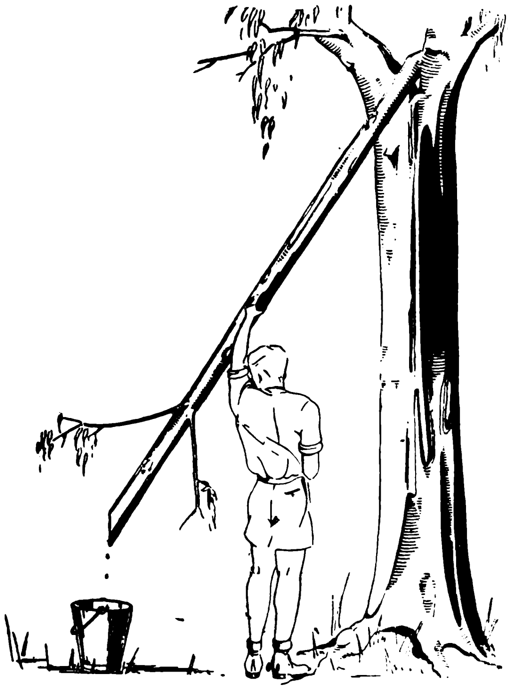
FINDING WATER IN THE FORESTS

WE now come to methods for finding water in the eucalypt forests. Here, the trunk and not the roots of young saplings is used. The typical water-tree is a tall, thin youngster with a vigorous, healthy appearance and a good crown of fresh-looking leaves. Choose a sapling about five inches in diameter near the butt, cut it off close to the ground and again just below where it branches. You have already learned that water flows up the trunk to the leaves, so it is obvious that to get water from a sapling you must turn it upside down. The job is made easier if you wedge the butt in the fork of another tree with the smaller end held over the water container, because it saves you from the strain of holding a heavy length of timber in an upright position.

Beads of water will appear on the cut surface of the wood and begin to drip off; when the flow ceases cut the sapling in half, reject the bigger end and the flow will start again from the thinner portion. When this flow ceases in turn, cut it in half again and proceed as before until you are left with a piece of wood about eighteen inches long, which was formerly the highest portion of the sapling. Knock off the bark, put your mouth over the bigger end and blow down it—hard. A pint of water, clear and almost tasteless, will often run from a twelve-foot sapling. If draining, cutting and blowing yield only a few drops of water clay-seal the

bigger end of the eighteen-inch piece and steam out the water.

Let us make another imaginary tour of Australia, describing some of the trees that yield water in this way and the



DRAINING WATER FROM A SAPLING

places where they are found. In the Kimberley area in the far north of Western Australia very few trees run water from roots, but nearly all the young saplings of gum-trees and tea-trees will yield water, even out on the barren pindan plains. In the latter case you must either select trees which grow on the banks of watercourses (even if these are nothing

more than creeks which run only after a heavy rain) or only those saplings which have that unmistakeable healthy, flourishing appearance, especially the heavy crown of foliage.

Farther south, missing that bad stretch of country south of Broome—well-named the "Madman's Track"—we reach an area whose dry creeks are lined with gum-trees. The young saplings found among the bigger trees will run water, especially the species with a smooth bark that looks very like the river redgum of South Australia and Victoria, and another species whose equally smooth white bark is covered with a flour-like powder which rubs off on the hand. Still farther south the flooded gum is found, mostly on creek banks, and a tea-tree with a black, slightly rough, but not papery, bark. Next comes the jarrah country; jarrah saplings are full of water and so are those of the karri, wandoo, and other eucalypts found from New Norcia south to Albany and beyond.

However, this method of obtaining water is not successful in the forests of tall and beautiful salmon-gums that you find farther east.

In South Australia water runs from the trunks of saplings of the red-gum, manna-gum, stringybark and some species of box. In Victoria it runs from the saplings of many species of forest trees, and this is also true of the gum forests which stretch from Gippsland through New South Wales and Queensland to the tip of Cape York. My job in the Army took me through all the country that has been described and never, whether in Gippsland forest or on the Atherton Tableland, the Blue Mountains or the Darling Downs, did I fail to find some species of gum-tree, mahogany, turpentine or tea-tree whose trunk would run enough water for a drink. In peacetime I have been called out to assist in finding hikers who were lost; when found, they were often badly in need of a drink, which we usually obtained for them from a nearby tree with the aid of a tomahawk or knife. They were not

to blame for the fact that they were suffering from thirst with trees full of water all around them—they had never been shown how to get it.

There is a story that if the trunk of the bottle-tree of the Kimberley and parts of Queensland is struck with an axe a copious, crystal-clear stream of water gushes forth. I used to read a lot of stories like that in the days of happy childhood; the one which I liked best concerned Goldilocks and the Three Bears. Here are the *facts* about getting water from a bottle-tree. In the Kimberley, do not pick a big old tree but one quite young—no more than nine inches in diameter. Cut a strip of bark from the trunk about four inches wide and two feet long; do not be one of those vandals who kill trees by taking off a strip of bark right round the trunk. Under the bark you'll find a layer of soft and spongy sapwood. Dig it out in chunks of convenient size and chew them. You will find that each chunk yields about a teaspoon of water with a pleasant, sweetish taste, while the wood is reduced to a ball of fibres. Even if you are very thirsty, half an hour's steady chewing gives you all the water you need for the time being. The best results are obtained from the Queensland bottle-tree by cutting a V-shaped gash through the bark and into the sapwood, and catching the water in a billy as it drains from the bottom of the V. Once again, pick a young tree and leave the big ones alone. The bottle-tree is so characteristic that nobody can mistake it for anything else; the shape of its trunk is exactly like a long-necked bottle.

In jungle (rain forest) you obtain your drinking water from vines (lianas) or canes (rattan). Slash through the vines close to the ground and again as high as you can reach, chop the lengths into short pieces, and turn each piece upside down to drain out the water. Always let the first teaspoon of water run to waste to wash away the stinging crystals (oxalate of lime) in the bark, and it is a good plan to give

the length of vine a point like a lead pencil instead of the usual slanting cut. *Never* blow down or suck jungle vines: if you do the stinging crystals will give you a very sore mouth and throat. As in the case of water from roots, never drink anything with a bitter or burning taste, or a milky juice.

A few experiments in any patch of jungle will soon show which are the water-vines; they differ greatly in appearance, colour of wood when cut and so on, depending on the area in which you happen to be. In New Britain the best water-vine has no nodes (joints) and when cut the wood exhibits concentric rings of pink, cream and white. In Dutch New Guinea and on Cape York the best vine has a rough, cork-like bark which rubs off in the hand. Farther south in Queensland the best water-yielder has well-marked joints at irregular intervals. When cut it is a clear, creamy-white colour with a small brown spot in the heart.

Excellent drinking water comes from the lawyer cane (rattan). Pick the biggest and longest cane you can see, cut about fifty feet of it, chop into short pieces, blow down each and the water will squirt from the end. Another cane which, unlike the lawyer, has no tendrils armed with horrible saw-toothed hooks, will also yield water.

Two plants whose fleshy leaves will yield a drinkable liquid are the "pig-face" of the coastal dunes and the parakeelia of the inland, which grows on sandhills after good rain. Crush the leaves between the hands and collect the juice in a container. It has a sickly metallic flavour but causes no ill effects, although anyone forced to use it in place of water for a few days will not have happy memories of the ordeal. I haven't, at any rate.

These are the main facts connected with the water-yielding trees and plants of Australia; the reader can rest assured that everything mentioned has been thoroughly tested out. In the Army we had to demonstrate these things repeatedly, often in country where an aborigine might have jibbed at the task,

and never once did we "stage a flop" by failing to demonstrate in the field, nor did any of those splendid bushmen from the V.D.C. who often gave us a hand ever fail.

There were failures, however, plenty of them. They were always made by men who listened to a few talks, watched a few demonstrations and then rushed off to set up in business on their own account. There always are people ready to bolt with an idea. In this case they merely proved that a little learning is a dangerous thing and brought ridicule on themselves. The bushcraft student must avoid this trap at all costs; he should not try to instruct others until he has mastered the subject thoroughly and he should see that his pupils are taught properly.

Another pitfall lies in accepting hearsay evidence as fact. It is natural to want to learn all you can, and you should be willing to listen to anyone who may have something new to tell you. Quite a lot of useful information is picked up in this way, but also a lot of absolute rubbish. There is only one safe rule: no matter how good a bushman your informant seems to be, do not believe what he says unless he demonstrates it to you or until you have made it work yourself. Many people will pass on hearsay information with all the confidence of a racing tipster giving out winners, and like the racing tipster, they are more often wrong than right.

Here is a typical example. Times beyond number we were told, or saw it solemnly stated in print, that fresh water can be "obtained at shallow depth by digging where the pandanus palm grows". This is not true. The pandanus palm is an indication that you can find fresh water only when you find a great, luxuriant thicket of it in a swampy spot, and you know you'd get water there anyway. For every clump like this there must be about ten thousand of these palms growing on soil so arid in the dry season that you might dig right through to China without striking water. There are at least

hree well-authenticated instances where this piece of false nformation nearly cost men their lives.

In 1942 false information did cause a man to die of thirst. A soldier in the Armoured Division was told that you could get water by digging under Christmas-trees. This is quite incorrect, as the Christmas-tree does not indicate the presence of water at shallow depth, nor will its roots or trunk yield as much as a drop of water. Unfortunately, the man believed it. He was on a truck which broke down near Three Springs and he walked off into the scrub to find water under Christmas-trees. He dug hole after hole in vain; having never heard that you could get water from tree roots, he wandered for miles past water-trees and ended by dying of thirst close to a "bull banshee" tree (*Banksia grandis*) one of the best water-root trees in Australia.

There is a double lesson in the fate of that unfortunate young man. Firstly, it shows the criminal folly of passing on false information; secondly, it shows what can happen if you don't try things out for yourself. To learn the easy way you practise all these tricks when there is no immediate necessity for them; to learn the hard way, you wait for the emergency to arrive before making any attempt to put theory to practical use.

Why do so many people choose to learn the hard way?

Before I close this chapter, I should mention the identification of trees and plants. Don't try to copy the expert who walks along and identifies, say, a messmate or a grey-box at a single glance and often from a long way off. This faculty comes only with long practice. Go about the job in a scientific way. First examine the bark; is it smooth or rough? Loose or firm? What colour is it on the outside, and on the inside when cut? Is it thick or thin? Next, cut through the sapwood into the heartwood, noting the colour and texture of each. Now look at the leaves, note their colour and shape, whether they are the same colour on both sides

and how the veins run. Try to find a young plant or sucker of that species of tree, since the young leaves of many of our eucalypts are very different from the adult foliage. Finally, note every feature of the flowers, the unopened flower buds and the seed-pods (botanists always refer to the last-named as the fruits). Put all those particulars down in your note-book. If you do this with the aid of a handbook, such as the *Key to the Eucalypts of Western Australia*, put out by the Forestry Department of that State, or *Know Your Own Trees* by R. T. Patton, which deals with the forests of Victoria, you will soon pick up the knack.

The best practical guides to timber identification that you'll find in the bush are the beekeepers, whose living comes from the trees. Often they know only the local names, but they don't confuse species as a general rule. And they *can* pick them out at a distance which seems incredible to the uninitiated. Later on you can learn the botanical names of the species you can identify, but to do that from the start is often too hard for the beginner.

CHAPTER III

GUIDES TO WATER

HERE are several guides to open water in the form of ɪgoons, creek pools, rock-holes, springs and soaks. King mong them is the wild pigeon. In pleasantly warm weather ıost pigeons drink only at sunset, but in very hot weather ıey drink twice a day, just at daybreak and again in the vening. The flight of the wild pigeon is quite distinctive; trained eye can pick out one of these birds on the wing at ny distance up to three or four hundred yards. The best way ɔ learn to use the wild pigeon as a guide is to start at the nd and work backwards.

Go to a bush waterhole about an hour before sunset, 'earing neutral-tinted clothing or, better still, camouflaged lothing dyed in patches of khaki and green, and put a few wigs round your hat and over your face as an additional isguise. Sit down beside a tree, rock or bush close to the ank and keep quite still. You will see pigeons arrive, perch n trees for a time, flutter to the ground, walk to the water ı a nervous, hesitant way, drink swiftly and fly off. That the first step: do nothing except watch pigeons arrive and rink. Next evening sit down about two hundred yards from ıe same waterhole and watch for pigeons flying past. noting articularly their characteristic flight and the way in which ıey all head for the spot where the waterhole lies. On the ɔllowing evening choose a spot at least half a mile back nd note how the lines of flight all converge on that one

spot. Continue until you are quite sure that you can distinguish a pigeon from all other birds by its flight alone, and can detect from the lines of flight the direction in which the waterhole lies. Then go into another area and find a waterhole solely by using the pigeon as a guide.

The day may come when that bit of practice may be very useful. Countless men in Australia have been saved from hardship or even death by these birds; here is one case. In 1885 the South Australian Government sent David Lindsay from Adelaide to the Territory to survey the country on the Barkley Tableland which had recently been taken over for cattle stations. My father, then a lad of eighteen, accompanied the party and kept a diary which I still cherish. Here is the entry for 23 February 1886:

"Todd River, Macdonnell Ranges. Everything parched with drought. Only a few pints of water left in the kegs. Camels and men prostrated. If we don't get water we'll perish."

My uncle took the strongest camel and went off looking for water, but failed to find it. Worse still, he found no recent signs of aborigines. Returning to camp that evening, in a far from cheerful frame of mind, he saw a solitary rock pigeon flutter across the gorge ahead of him. He noted the line of flight, followed it up the hill and, in a spot where nobody would normally think of finding water, came across a rock-hole containing thousands of gallons. Several days later, near Illinga spring, the party found the first aborigines they had met in the ranges, a small clan of the Arunta tribe. These natives stated that the drought had driven them out of the Todd country; to use their own dialect, it was a case of "quatcha queandaritchika" (water all gone) there. There was only one place where water would be found—a rock-hole high on a hillside. It was the waterhole to which the bird had guided my uncle. If it had not been for one little bird the entire party might have perished.

That is why no bushman worthy of the name will shoot a 'ild pigeon, unless no other food is available. He knows that ıese beautiful and harmless birds have saved many a life nd may save his own some day.

A full list of the pigeons of Australia will be found in ny good bird book; Neville Cayley's *What Bird is That?* ; especially recommended on account of its excellent colour lates. Among the pigeons most useful to the bushman is ıe river dove, seldom seen but easily recognized by reason f its clear "Wardle-warp" call; it does not guide the way ɔ water as a rule but its presence shows that water is near. lext comes the bronzewing, as large as the domestic pigeon, nd the little plumed pigeon, with a cockatoo-like crest. n following the last-named species to water, always remember hat it goes so in short, quick flights, with frequent pauses or rest. There is also the squatter, a big pigeon of the open ılains, which makes a loud whistling with its wings as it lies, and the rock pigeon of the Kimberley, especially useful here in the dry season, because it lives in those sandstone .reas where water is so hard to find.

The bushcraft student who lives in Adelaide, Melbourne or ;ydney can visit the zoological gardens, study these pigeons n their cages and thus learn quite a lot about them before 'oing bush.

Some of the finches are good water guides, chiefly the hestnut ear ("headache bird"), which need not be seen; its nonotonous chirp of "Teut-teut, teut-teut" is unmistakable. 'hen there is the diamond bird, a tiny, fearless, charming hing which can be seen moving over the outer limbs of the ıig trees, making a snipping sound with its beak as it feeds. The diamond sparrow is larger and is easily recognized by ts spotted waistcoat. The Murray magpie, or peewee, is in he same class and so is the bottle swallow, which builds ts mud nest high on crags under shelves of rock or in caves. t must be remembered, however, that these two birds, like the

finches, do not lead you to water; their presence, especially in really hot weather, merely indicates that water is not far away. When in arid country, it is a good plan to spend a whole day at a waterhole watching the birds as they come to drink. In this way you soon learn to recognize those which stay close to water.

Last on the list of birds, but one of the most important, especially in the interior of Australia, is the black cockatoo. When nearing a spot in scrub country where there may be water, the old bushman begins to get anxious if he fails to sight black cockatoos, but if he sees a flock of them—they can be detected a long way off by their heavy, slow wing movements—he knows that there is still water left.

Animal pads are not, as a rule, infallible guides to water but they can be very useful. When following them, remember that if the tracks converge on the one which you are following, the water lies ahead, but beware of following one which forks repeatedly; that means you are heading the wrong way. It is also worth remembering that cattle usually drop their dung after drinking and not on their way to water.

Bees are very good guides. If you find a hive of domestic bees gone wild, *not* the tiny, stingless, native bees, in a hollow tree, get below it when the air is warm and look up at the sky. Watch the bees as they move in and out of the entrance. Those which scatter in every direction as they fly out are the honey and pollen gatherers; disregard them. In the hot part of the day you will see one line of bees which always heads towards, and returns from, one particular point of the compass. This is the watering flight. Move about until this line of flight shows up strongly in the sunshine and you'll soon see where the waterhole lies.

We now come to that old standby of the aborigines in time of drought: water obtained from frogs. Suppose that you have come to a swamp or a waterhole with a clay bottom which has dried up; the mud is as dry as the proverbial

imeburner's boot and is cracked in all directions like a crazy ›avement. You will often read, and be told, that you can lig anywhere in that dry mud to find the frogs, but such a tatement immediately brands the person responsible as yet ınother of the numerous band who write or talk about things ›f which they have no personal experience. It isn't as simple ıs that. First you must find the lowest point of the hollow; hat is where the last big pool lay. Next, remember that frogs lon't wait until the last of the water has dried up before ligging in; that would put them at the mercy of the birds, ınd also the heat of the sun would make very shallow water oo hot for them to live in. Imagine where the shoreline of he last big pool was when it still held about eighteen inches ›f water, and dig around that line first. You'll find the frogs, :ach with its body distended with water, in little cells in he clay some nine to eighteen inches below the surface. ᴾick each up by the hind legs, hold it mouth downwards, ınd squeeze the body; about half a teacup of water runs ›ut of the mouth. Kill the frog with a stamp of your foot; lon't toss it aside to die a lingering death. In creek beds pick he deepest holes along the bed but always dig under the ›ank on the shady side. In some places where the beds of he creeks are entirely composed of sand another type of 'rog hides in burrows under the shady bank, but it is very ıard to find—even the aborigines have trouble—although ›ometimes at early dawn you can track it, for it comes out ıt night to feed.

If anyone says that he would sooner remain thirsty than lrink water which has been stored for a year or more inside ı frog, it is a sure sign that he has never been through the ıgony of thirst. Those who have known that will drink ınything wet.

When a drought breaks over the Inland, the most striking ·esult is the ringing frog chorus which arises from every waterhole, creek and swamp. There are often millions of

them. That will give you some idea of the number of frogs which hide in the dry mud during the drought. They are there all right—if you know where to find them! There is no need to go into the dry outback to practise finding frogs in the mud; you can do it anywhere in Australia where the waters dry up at some time of the year and where the frogs appear again as if by magic after rain falls.

Water can be found at a shallow depth by digging. Imagine that you are in need of water and that in the distance, across a plain shimmering in the heat, you can see the line of trees that indicates a watercourse. When you reach it you find nothing in the bed but dry sand. Walk along the bed, keeping your eyes on the alert for three things:

1. Tracks of dingoes or horses, with hollows which have been made by scratching or pawing.

2. Numerous little burrows under the bank on the shady side, each with a pile of pellets of mud before it (these are yabbie burrows which go down to water or to very wet sand).

3. Timber on the bank with a very fresh, green and healthy look.

By digging in any of these spots you have a good chance of striking a soak. A fairly reliable indication is a patch of water rushes, easily recognized by their long smooth green sprouts and a bunch of brown flowers near the tip. For digging to be worth while the rushes must be at least six feet tall and very green and vigorous in growth. Even so, you may only strike a patch of damp clay beneath them, though such a hole often collects a little water during the night.

When in country where big, dome-shaped masses of rock (usually granite) outcrop on the plains, scan the edge of each one for a patch of bright green vegetation and dig among those trees for water. Those rocks shed rain like an iron roof and most of it soaks into the soil and is lost, but here and there under the surface there are pockets of sand

or gravel which will store water, although their presence would never be suspected were it not for the vegetation above them. In all the cases mentioned above it is a good thing to remember that redgums in eastern and southern Australia, and flooded gums in Western Australia, mean that the underground water will probably be potable (fresh enough to drink) while the presence of a few big, healthy-looking she-oaks among the gums is an even better sign.

Where an inland creek debouches on a plain through a gap in a range, the floods carry down sand, gravel and mud which build up a fan-shaped delta ("cone of dejectment") on the plain. This area is usually marked by a larger and more vigorous growth of vegetation than that on the surrounding arid plain, and the species are different, too, being mainly redgums and other trees which grow best when they can get their roots down to a water-table. The best place for a well is as close as possible to where the creek-bed emerges from the hills, with the size and appearance of the timber as your guide.

It is often said and written that you can find fresh water by digging on any beach above the high-tide mark. A fitting punishment for the person responsible for such a misleading statement would be to give him a good meal of salt fish with nothing to drink, then hand him a shovel, point to the beach, and ask him to put his theories to the test, or go thirsty. As I belong to that little band who dug holes on beaches along two-thirds of the coastline of Australia, I know that his chances of getting water fresh enough to drink would be mighty slim.

Fresh water *can* be obtained on some of our beaches, but such places are usually few and far between. Where sandstone outcrops along the shore you can sometimes find threads of fresh water trickling down the sand at low tide, or across granite slabs below limestone cliffs. These little trickles can sometimes be located from a distance by seeing numbers of

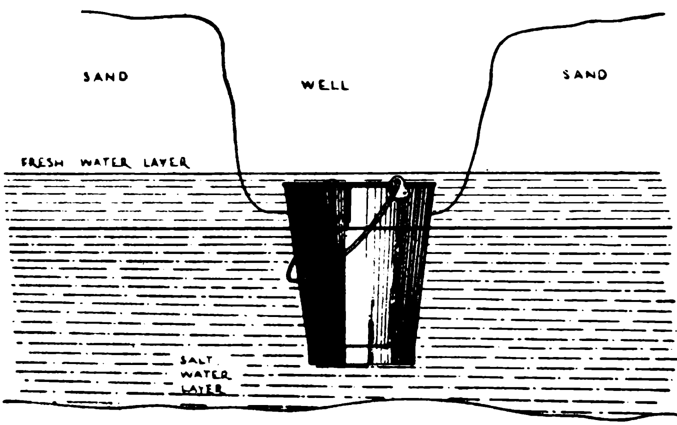
birds arrive at and depart from the same spot. There are also a surprising number of springs around our coasts which are uncovered only at low tide; their presence is usually revealed by animal tracks across the beach, a watering flight of bees making for the place where the fresh water emerges or, on a hot day, a flock of finches perched on trees and bushes waiting for the tide to ebb.

Where there are big sand dunes at the back of a beach you can usually get good water if you know where to dig. You should first climb a dune and look for a big hill of white driftsand, standing at least one hundred yards back from the high-tide mark. Walk to that sandhill and seek the deepest hollow you can find around its base. Dig as close to the slope of the dune as possible. If the hole is more than a few feet deep, be sure to timber it with bush sticks or driftwood. This is most important, since sand caves in without the least warning and has caused many deaths. If you can't timber be sure to slope the sides well, and remember that a round hole is less likely to cave in than a square one. Water is usually struck at depths ranging from two or three feet to ten or twelve.

Why do you usually strike fresh water in these places? Pay no attention to the common but nonsensical explanation that "sand filters the salt from the seawater". The explanation is that the hill is driftsand, which soaks up rain like a sponge; no vegetation grows there so there is no transpiration by roots; there is far less capillary attraction in sand than in soil, so most of the water which soaks into the sand stays there and can sink no farther than sea level, because there it meets the bed of salt water which has soaked through from the sea. It is a curious fact that fresh water will float for ever on top of a layer of brine, like cream on a pan of milk. Every big hill of driftsand, therefore, is a potential catcher and storer of rain-water and your well at its base is designed to tap that saucer-shaped "cream" of fresh water beneath it.

You have to get some distance back from the beach in order to avoid the rise-and-fall influence of the tides.

Sometimes the water is fresh when struck, but as the well is deepened it becomes salt and stays salt. This means that you have passed through the fresh water into the brine and have mixed the layers. To overcome this trouble get a bucket, a drum with the top cut out, a watertight box or anything else that will serve as an impervious sump. Its top must be level. Sink this in the bottom of the hole until its upper edge is about an inch below the surface of the water. Now bail gently for some time, taking care that the water removed is thrown as far from the well as possible. Stop when the water inside the sump is fresh. The sump shuts off the salt water and the only water which can enter has to flow from the upper layer.



SUMP TO SHUT OFF SALT WATER

The aborigines use a trick worth copying. Get a length of reed or bamboo and knock out the joints—a thing quite easy to do if you have a long piece of stiff wire, but a time- and patience-consuming job if you have to do it with sticks.

You also require a straight stick of hardwood a bit bigger than the bamboo. Instead of digging a well drive this stick into the sand, rotating it all the time, and at intervals working it up and down to prevent it from sticking tightly in the hole. A squelching sound below and a tendency for the stick to bounce at each blow instead of driving deeper will indicate that water has been reached. Tie a bunch of dry grass over one end of the bamboo, withdraw the stick and at once push the bamboo down in its place. The grass tied on the end keeps back the sand and you can suck up what water you need. You will soon find, however, that this is one of those things that sound remarkably easy in theory but are very difficult in practice.

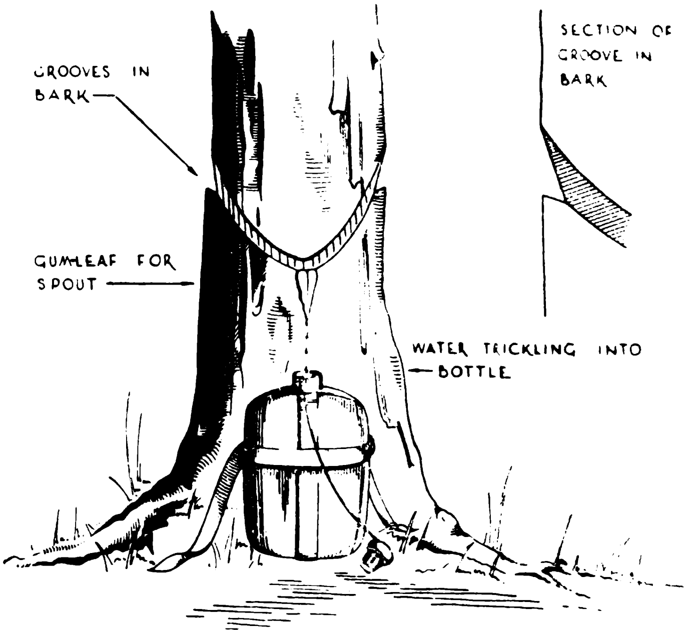
The most valuable guide to water along our coasts is the presence of a large mound of the shells of cockles or other edible shellfish, mixed with ashes and bits of calcined bone, heaps of fire-splintered stones and a scattering of chips of flint, quartz, or other hard rocks on the surrounding ground. These mark a site where the aborigines used to camp and there should be a good spot for a sand well close by. In fact, evidence that aborigines had an established camp anywhere in Australia is an excellent sign that water should be found close at hand, though a little common sense must be used by taking into account the possible effects of erosion, and the fact that some water supplies are seasonal, existing only after good rain. You must always keep one vitally important fact in mind as well: seldom, if ever, did the aborigines camp right alongside a water supply, especially if it was the only one in the area. As they will tell you, they left that sort of thing to those silly fools, the white fellers. They would camp a few hundred yards away and thus allow the game to drink undisturbed. Many white men, by camping right on the bank of a waterhole, prevent the birds and animals from drinking there and thus force them to move to another locality.

The bushcraft student should, if possible, familiarize himself with the shape and appearance of every form of native stone implement, from pounding and hammering stones to axe and adze heads, and from knives and scrapers to sharpening stones. This can be done by visiting a museum. By being able to recognize these primitive implements at a glance, you can often locate a water supply whose existence you might not otherwise suspect.

Along the northern coasts of Australia and on some of the islands we found that tamarind, mango and similar trees on the shores of a sheltered bay marked a spot where the Malayan sea rovers used to camp when making voyages in their proas to collect trepang and turtle shell. There is always a water supply near these camp-sites.

Dew is a valuable standby. It can be sopped from leaves, grass or stones at sunrise with a little piece of clean sponge; you can shake it from fine-leaved plants such as the manuka or the dewbush and catch it in a camp-sheet, billy or bark dish. It can be soaked up with a towel, which you wring out when it becomes sodden—and doesn't the water from it have a lovely, "raggy" flavour if the towel is dirty!—and it can be shaken from flowers which hold a lot of dew. such as those of the banksia or bottlebrush. We have frequently gathered enough to last us all day in this way. In desert country, however, you must work as if your life depended on it, for you cannot do any dew-gathering until it is light enough to see, and the dew vanishes with surprising swiftness as soon as the sun comes up or the dawn wind starts to blow.

To catch rain when you haven't a camp-sheet or anything of the kind, select a smooth-barked tree or palm and cut two slanting grooves around the bark about an inch deep, meeting in a V. Be sure that the lower edge of the groove has an inward slope to make it act as a gutter. At the bottom of the V attach a piece of leaf to act as a spout. Under this



CATCHING WATER FROM A TREETRUNK

place your container. During a short but heavy shower we once caught two gallons in this way off the trunk of a salmon-gum. On some Pacific islands and along the coast of Dutch New Guinea natives use coconut palm trunks as water catchers in this way, although they prefer to tie strips of pandanus leaf or cotton-wood bark round the trunk instead of cutting the groove. The water is caught in a large clam shell.

If you have to improvize a water container, copy the water-skins of our aborigines, or the goatskin *gerba* of the Bedouin. Any small animal will do: rabbit, possum, wallaby, kid etc. It should be trapped or snared; shooting, except



PANDANUS LEAF STRIP TO CATCH WATER ON PALM TRUNK

through the head, ruins it for water carrying. Skin it by "sleeving" in the same way as rabbit skins are prepared for market, tie a knot in the skin of the neck if it is long enough; if not, lash it with twine or a strip of skin. Tie knots in the skin of the fore-legs, knot that of the hind-legs together to form a carrying handle, pack tightly with dry sand and

hang up to dry. When it is dry tip out the sand and you'll find the skin holds water like a bucket. Put the fur inside or out according to taste; the flavour of the water is the same either way, although having the fur inside does a certain amount of good by preventing loss of water through slopping and splashing. This can be further minimized by floating some leaves on top.

The body requires salt as well as water, so always carry a good supply in an airtight container in a climate where you sweat freely, or anywhere in hot weather. You must have salt in your bloodstream to be able to sweat; if the salt isn't there you collapse. Quite a lot of the fatigue felt during hot weather by some people, and by many others if they drink a lot of water, is nothing more or less than this same "stoker's collapse" caused by lack of salt. Some take it in the form of tablets (half or a whole one with each drink) while others prefer it dissolved in the water. The way salt acts as a pick-up when you are sweating freely is amazing.

These remarks about finding water cannot be concluded without mentioning the divining rod. In my opinion it is an utter fraud. It has never yet stood up to a properly conducted test. If you are interested in figures, here are some given to me by a very competent mining engineer who kept careful records over a period of years. When the divining rod was used to select sites for wells and bores, water was struck in 72 per cent. of cases. Where wells and bores were put down simply by sinking where you wanted the water supply—blind stabbing, in other words—water was struck in 72 per cent. of cases. Where a geologist selected a site as likely to yield potable water it was struck in 83 per cent. of cases. Work it out for yourself. The fact that countless thousands of people have a firm and unshakable faith in water divining means nothing; even more people have an equally firm belief that it is possible to make money by betting on the races. I prefer to rely on what the scientists

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CHAPTER IV

FINDING FOOD

THERE is a lot of loose talk about "living off the country" in connexion with bushcraft, but it would be far better to speak of "surviving in the bush". Unless one is very good at it it is difficult always, and in some areas a very grim business indeed. If you have some reserve supplies of civilized food with you, however, you can make those emergency rations spin out in a wonderful way by adding native foods to the menu, but you'll never do it unless you are prepared to eat almost anything that swims or crawls, flies or walks. In this regard, some of the foods which sound least attractive will be found to be the best when you sample them.

A typical example will be found in that great bush stand-by, the witchetty grub. You don't fancy it as food? You'd sooner starve than eat it? Well, that last statement brands you as one who has never been *really* hungry, and will you please inform me what can be used in its place? Something both nourishing and tasty that can be secured almost anywhere, from the scrub on a windswept coastal dune to the sparse timber of Central Australia, from the jarrah forests of Western Australia to the mallee of South Australia and Victoria, from the wattles of the far west of New South Wales to the green gloom of the jungles of Queensland and New Guinea? You cannot? No—and neither can anyone else, for the good and simple reason that no other such food exists.

There is nothing unclean about this grub or its food. It ives only upon the wood inside treetrunks or roots and is ıot a scavenger; it could not be dirty if it tried. So what, xcept prejudice because it is a grub, is there against it as food? Its flavour when eaten raw is something like walnut; vhen cooked it is like sweet scrambled egg. To eat it raw, ou hold the head between the forefinger and thumb of the eft hand, pinch the skin around the anus with the right orefinger and thumb, and pull. This withdraws the entrails, vhich are nothing more than a tube filled with partly digested vood. You then bite the body off close to the head. When ooking them it is best to toss them straight into hot ashes ınd gut them after they are cooked. Like the egg, the witchetty grub is an almost perfect food. In the Army we had no neans of analyzing foodstuffs of this type and setting everyhing down in terms of proteins, carbohydrates, fat, ash and alories. We could only make a very practical test of its value by making a meal of it alone and then seeing how ar we could walk with nothing else in our stomachs, ıoting the time which elapsed before we felt hungry again ınd started to lose energy. Tested in this way, the witchetty grub was equalled only by eggs, cheese and the meat of vild ducks and kangaroos, and was beaten by nothing.

My final argument will take a lot of knocking out. My ıote-books show that at our classes 4483 men, ranging from ı general to O.R.s, ate these grubs, and of that number only ıine said they didn't like them.

Witchetty grubs brought a bit of trouble on my head when was lent to the United States Army. I showed the Yanks ıow to find them and they voted them as good as anything hey had ever eaten, but a few days later complaints began o pour in from the landowners whose properties lay around he American camp. Armed with tomahawks and machetes, he Yanks were cutting down all the wattle-trees in the area o get the grubs and, naturally, the farmers were objecting.

Occasionally you meet the man who says "I'll eat that sort of thing when I have to and not before." You can usually show that type of man the error of his ways by handing him a tomahawk and asking him to get you a few grubs for demonstration purposes. Unless his hobby is freshwater fishing and he has had some experience in obtaining them for bait, he soon reveals that he doesn't know the first thing about finding them. You can then ask him how he expects to get them in order to eat them when he has to. In bushcraft there is no argument as senseless as "I'll do it when I have to and not before". It isn't clever, nor is it humorous. It's folly. You might as well state that you will swim when you have to and not before as an excuse for dodging swimming lessons.

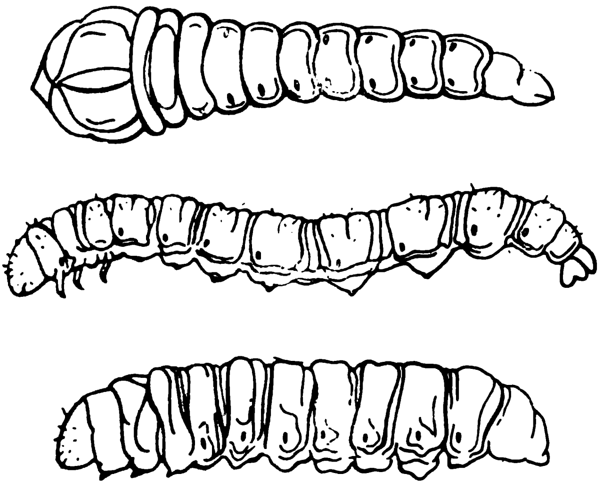
The bushcraft student should learn to do everything now, even if it might be a bit unpleasant, and not wait for the emergency to arise before trying his hand at it.

There are three main types of witchetty grub. The smallest has a square head and a body smaller than the head; it is the larva of the longicorn beetle, and seldom exceeds two inches in length. The second is more like a silkworm in appearance and attains a length of three inches or more with a circumference about that of a man's little finger; it is the larva of the wood moth. The third is the larva of the ghost moth, which attains a length of five or six inches and a circumference of three inches. Four or five of these big ones make a full meal.

I use the term "witchetty" for this grub because it is an aboriginal name which has been adopted by many whites. (I hope I live to see the day when many more such euphonious native terms will be adopted, as the Americans have done with Indian words.) Other aboriginal names for this grub which we have adopted are: bardie, purdie, pelattie and jamboon. In pidgin it is "lik-lik senake belong dewai" (little

ake of the tree) and in Malay it is "oolar sargo" (sago ub).

Here are instructions for finding these grubs. In the imberley you look for what appears to be a heap of sawdust the base of a sapling; it is really chewed wood which has ıssed through the grub's digestive tract. Find the hole from hich this wood dust is trickling and haul out the grub with



THREE MAIN SPECIES OF WITCHETTY GRUB

bent wire or a twig with a hook on the end. Farther south ook for the same trickle of sawdust on big acacias, or walk mong the smaller wattles on the sand-dunes, searching for hose with a sickly, stunted look. Grasp the stem of such wattles low down with both hands and pull. If the sickly ppearance has been caused by grubs eating out the root ystem, the plant will come out of the ground and the grubs vill be found round the base of the roots. Still farther south n Western Australia look for the grubs in big wattles which ave the familiar heaps of wood dust at the base of the trunk

or under limbs, or find blackboy trees (yaccas) which have died recently. Kick the latter to pieces with your boots and you will find them riddled with grubs. These rules hold good until you strike the mallee, where you must seek out clumps with a sickly, half-dead look; dig up their roots and you will find the grubs at the end of long tunnels through the centre of the root. Another method is to scrape away the leaves and earth around the big gnarled root at the base, looking for holes in the ground; explore each hole with a wire or a hooked twig, since it leads to the tunnel which the grub is eating out in the wood.

In the south-eastern portion of Australia you will find witchetties in wattles, particularly the golden wattle, the weeping-willow or the redgum. With the redgum you adopt a different technique. First ascertain, by looking at the base of the tree, where the big roots run out from the trunk and then, directly above each root, chip off the grass, leaves and the top half-inch of the soil with a spade. This will reveal round holes in the soil up to nearly an inch in diameter. Explore each one with a hooked wire; if the grub is "at home" in the tunnel in the root below you can feel the movement through the wire. Hook him and pull him out. In inland Australia, adopt the same method with redgums on the banks of creeks, or search for native poplars and wattles which have that half-dead look with which you soon become familiar. Give each one a hard push; any with grubs in them will snap off just below ground level, revealing the grub-holes at the base of the roots. After that it is a matter of a bit of chopping and digging or some juggling with your hooked wire to get them.

In the coastal scrubs of New South Wales and southern Queensland go through the eucalypt forests seeking spotted gum or similar saplings with ragged patches near their base where the wood has been torn to splinters. That is the work of the black cockatoo, which locates the grubs by listening

at the base of the saplings. If the bird hears the rasping and gnawing of a grub's jaws inside the tree it starts to tear the wood away with its powerful beak; often the birds will fell a sapling as thick as a man's arm to get a grub. A place where these birds have been at work, or are actually working, is always a good witchetty patch.

In the Queensland rain forests look for fallen logs of the candle-nut, milky pine or similar softwoods, with heaps of wood dust beside them, or look up at the jungle vines in search of lianas which have been ripped to pieces by black cockatoos. In the New Guinea jungle look for the same fallen logs; in the swamps the trunks of sago-palms which have flowered recently and are now dead are often riddled by hundreds of grubs. Along native paths you often see one particular species of softwood from which the bark has been knocked by natives in order to give the moths and beetles a good place to deposit their eggs. Within a few months there will be a large heap of wood dust at the foot of these trees and by poking with a stick you will find that the entire heart of the tree is being eaten out, for a shower of wood dust and grubs will come down. Split open the trunks of coconut-palms which have blown down or have been felled recently.

Even if you don't want to eat these grubs it will pay you handsomely to learn how to locate them wherever you happen to be, as they are the best of all baits for freshwater fish. A Murray cod will take one when it won't look at any other bait.

The larvae of many species of ants, usually referred to as "ants' eggs", are another standby. They can be dug up from nests in the ground with a lot of trouble, but are more easily found by smashing open old stumps in which they have made their nests, or by rolling over stones. You usually get them well mixed with dirt; very few whites can master the knack of separating eggs from dirt by "yandying" them on a sheet of bark as the aboriginal women do, but you

can make a fair job of it by throwing them on water; the dirt either sinks or can be brushed away, leaving the eggs floating in clusters. Raw, they have a floury taste; toasted on a hot stone, they resemble bread in flavour.

Most whites shun snake as food, but when roasted in ashes it looks very like fish although the flavour resembles chicken more than anything else. I never had any trouble about persuading Americans to try snake; in the United States of America rattlesnake is canned and sold as a very expensive delicacy, and most of them had sampled it before coming to Australia. It is an awful job to persuade the average Australian to try it, however.

You usually run against that senseless "I'll eat it when I have to" argument, and the proper treatment is the same as in the case of the witchetty grub—ask the objector to catch a snake for you. Usually, he shows at once that he doesn't know anything about snake hunting. It isn't easy to find snakes (though anyone is liable to stumble on an odd one by accident) and it needs great care. You have to look beside logs, heaps of stones or loose boulders in the warm part of the day in the cooler weather; in hot weather you do your hunting very early in the morning or late in the afternoon. Snakes may have poor hearing, but they are very sensitive to ground vibrations and there seems to be nothing much wrong with their eyesight, so the old Chinese proverb "Walkee softlee, catchee monkey", applies also to snake hunting. The lightest thump of your foot, a click from a loose stone or a sudden movement and the snake is gone before you can get in a blow with your piece of wire or a green stick. (Only very raw beginners use a dead stick, liable to break at the first blow.) Incidentally, aborigines will not eat a snake if they think it has bitten itself while thrashing about after being hit, and they always cut off, or bite off the head before cooking it. So do I, but I cut it. It may be only superstition, but it is best to be safe.

Most lizards, stump-tails, shingle-backs, goannas, etc., are uite good to eat and the last-named are especially valuable or their fat. Most of our game animals seem to have no at whatever in them, and anyone forced to live like a black-ellow for a time soon finds that fat of some kind is needed n the diet.

To secure game when ammunition has to be husbanded, r when you haven't a rifle or gun, a snare should be used. Aost books dealing with woodcraft contain diagrams of nares, but after testing out every one of them we came to he conclusion that only four were worth bothering about: he simple loop, the spring-up, the trigger-plate and the dead-all. We were forced to conclude that all the rest of the liagrams were merely copied from some other book which in urn had copied from another, and so on, back to some theorist vho first set the weird design on paper, or that they were leliberately drawn by people with a very perverted sense of uumour. I am quite sure that many of them would never vork unless you could first teach the game to read and then out up a notice beside each trap, requesting the animal to kindly insert its head at the spot marked X.

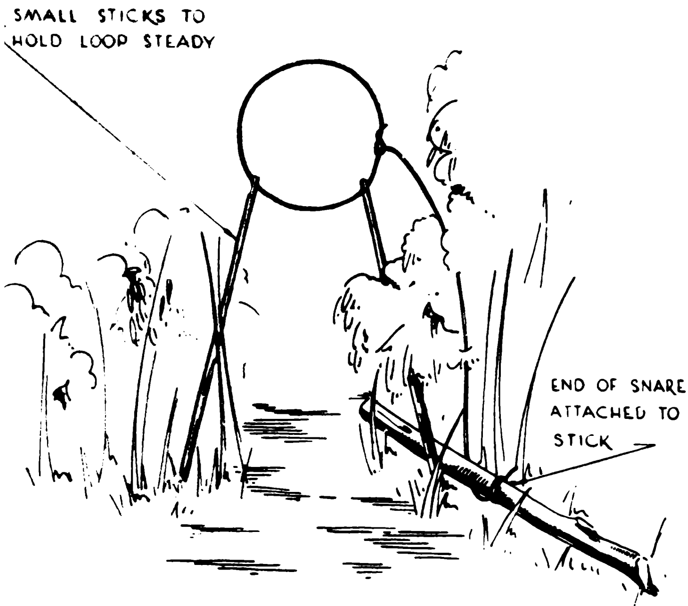
Simplicity is imperative in the design of a snare; shun all hose Heath Robinson devices which shoot arrows from bows, ling spears from bent limbs and so on. They *are* a snare—ind a delusion—but only to anyone silly enough to try to nake them work. It is one of my ambitions to meet one of he men who draws such designs and to challenge him to nake it work. If he can catch the tail feather of a tomtit vith it I shall be very surprised. Further, some books, written n many cases for Boy Scouts, include horrors like the stake pit trap, which is a pit dug on a forest game-pad and filled with sharp stakes, firmly set in the bottom of the pit and pointing upwards. The whole thing is then covered with a stick framework which is hidden under leaves and earth. What I would like to know is this: if any human being walked

along that track, unaware that the pit had been dug, and fell into it, who would face the charge of manslaughter which followed—the boys who made it or the person who drew the design and gave instructions for making it in the book?

Snares are best made from stranded brass picture wire, which can be had in all sizes, from the fine stuff suitable for rabbits and hares to the thick wire suitable for holding a kangaroo or wild pig. These snares can be carried in the pocket or a corner of the pack, weigh next to nothing, and will secure many a meal when you have learned how to use them.

The first step in setting any type of snare is to find a pad on which the animals travel regularly, either to water or from their burrows or lying-up places in the scrub to a feeding ground. Next, find a place where the pad passes between two bushes, two trees close together, two rocks or a couple of tussocks. This narrow place is where the snare is set.

In its simplest form, used chiefly for rabbits, hares, wallabies and other small game, the snare is nothing more than a running noose made in the wire, with a loop large enough for the head of your quarry to slip through. To set the loop at the right height for rabbits use your fist with the thumb held upright to measure the distance between loop and ground; for hares, two fists and a thumb; and for wallabies, about the height of the knee of a man of average height. The loop is held steady by means of two little sticks with split ends, but, unless setting snares of this type on open grassland, don't fasten the free end of the wire to a peg. Instead, tie it to the middle of a stout green stick about two feet long, laid parallel to the track. Wherever there is bracken, scrub, trees, rocks or brush, the animal won't be able to drag the stick very far before it is caught up in something; by that time the quarry is strangling and the fight has gone out of it. You must tie the free end to a peg in open grassland and you must also expect to have your snare wires broken

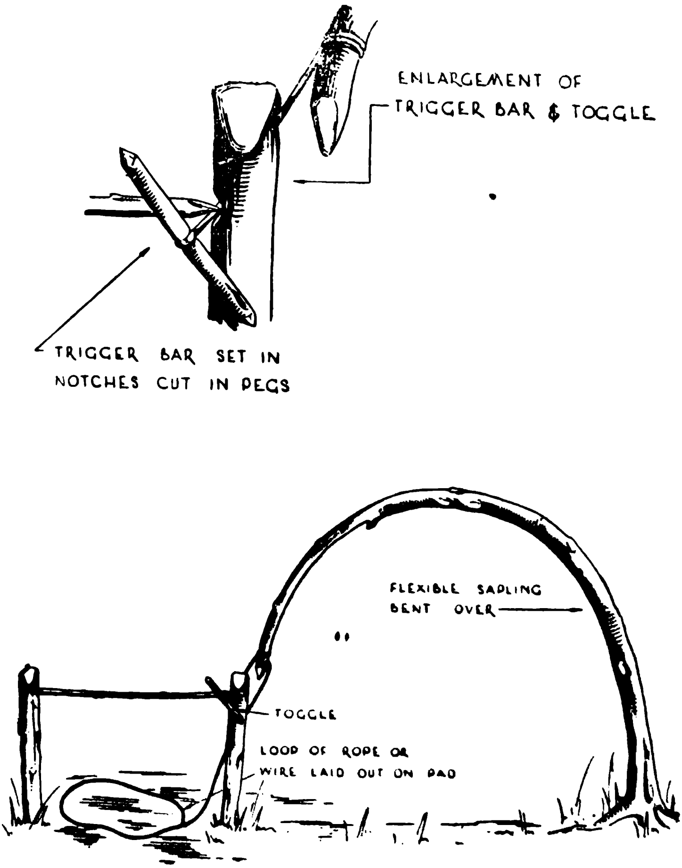


SIMPLE LOOP SNARE

ith exasperating frequency. Why not use a stronger wire this case? Well, the whole art of setting snares, apart from lecting the right places to put them, lies in having the ghtest possible wire; if it is too heavy and stiff for the eight of the animal you wish to catch, the loop won't run roperly, and a noose which won't tighten at a touch won't atch much for you.

If you cannot get wire you can use thin cord built up of trands of linen thread, fishing-line or string made from bush ibres, as explained in a later chapter.

To make a spring-up snare, drive two pegs very firmly on either side of the track, with a notch cut in the side of each about the height of the chest of the animal you wish to catch.

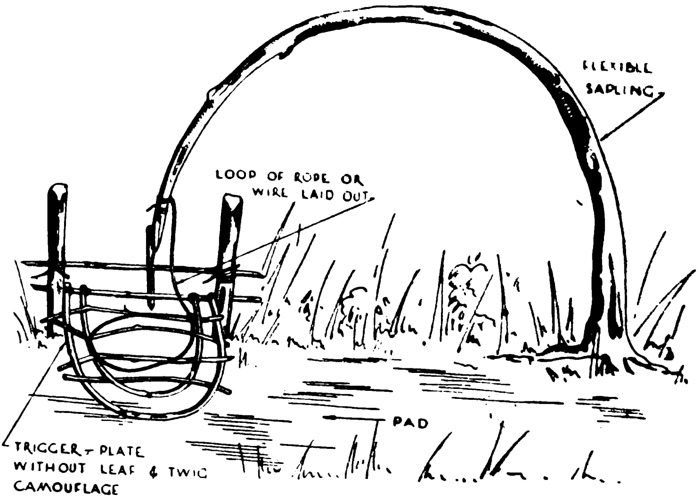


TRIP-STICK SPRING-UP SNARE

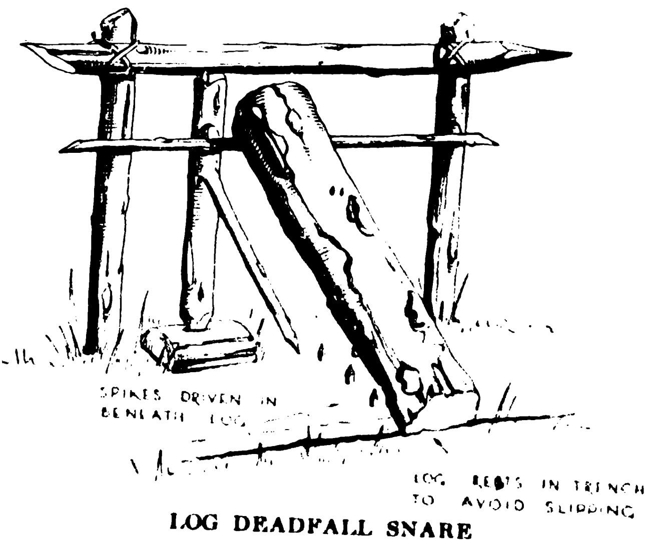
cross the pad, with its chisel-pointed ends fitting into these otches, you put a thin but stiff stick. Some six to eight feet ack from this, in line with the two pegs, you dig a hole a :w inches across and at least eighteen inches deep (even eeper if the ground is sandy or soft). Into this hole put ıe butt end of a long, thin and flexible sapling. To the top f this tie your snare loop, as well as a short bit of cord 'ith a two-inch toggle on the free end. Bend the sapling own until the free end is beside the nearer peg, slip the ›ggle under the trip-stick and across it and the peg, then lowly release your grip on the sapling, keeping your head ut of danger in case the trigger slips. If it holds, spread our snare noose on the pad to catch a leg of the animal. 'or big game you require a sapling so strong that it takes our full weight to bend it down. The sketch should make t quite plain how this simple yet very effective device is igged up. Any animal coming along the pad from either lirection has but to touch the trip-stick across the track to ›ush the free end of the stick out of its notch on the peg; his immediately releases the toggle at the other end and the pringer flies up, noosing and holding the leg of the animal vhich is almost bound to be on the ground inside the loop.

It is a good idea to wind a bit of bush creeper round the rip-stick to disguise it and to put a bough immediately bove the snare and across the track, so that the animal will ıot attempt to jump over the stick but will duck its head to ›ass beneath the bough.

The trigger-plate type of snare consists of a frame of cane r thin sticks in place of the trip-stick; the toggle is released vhen anything treads on the frame, which is laid across the rack and hidden by leaves. The springer flies up as it does ı the spring-up snare. The log deadfall consists of the eaviest log you can lift, propped up as shown in the sketch. ınything passing under it has to push the trigger-stick; this auses the free peg to revolve and the crossbar slips out of



TRIGGER-PLATE SNARE



LOG DEADFALL SNARE

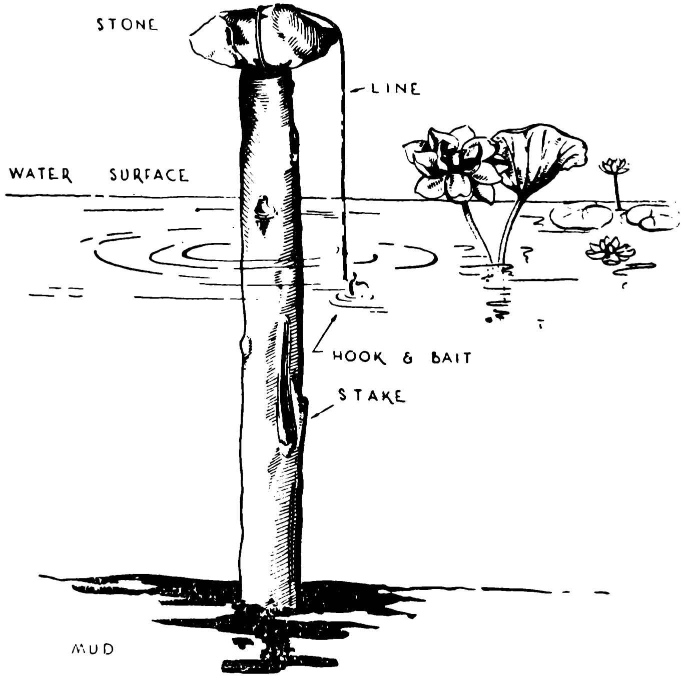
ie notch, letting the log drop. This type of trap isn't of uch use unless the ground directly under the log is studded ith short, sharp-pointed stakes, upon which the quarry is npaled when the log drops on it. Those spikes sound, and re, cruel things, but the alternative may be to have the ame get away, badly bruised and with a leg or two broken, ' die a lingering death.

It takes much practice and a great deal of patience and inning to snare really wary game, such as deer or wild oats, but you can get a lot of experience by setting up iniatures of these three types of snare to catch rabbits. The reat curse of any snare is the animal either too big or too nall to be caught in it, which brushes the simple loop aside r springs the other type without being caught.

When using bait to lure an animal to a snare always lect, if possible, something which the animal likes but ldom secures. Chips of quince, carrot, apple or potato will tract rabbits; the edible hearts of palms or yaccas will lure early all grass-eaters. Away from the coast, salt is a great ire for deer and wild goats. Pigs are attracted by camp raps.

I have purposely given no hints about snaring possums. way from fruit and flower gardens, where it can do a great eal of damage, it is a harmless and pretty creature; to kill needlessly is a crime.

To snare wild duck use fish-hooks set as shown in the etch and baited with a witchetty grub, frog, yabbie, worms r similar stuff. When the duck swallows the bait the hook itches in its throat; when it pulls away the stone falls off ie top of the stake, drags the bird's head under water and rowns it. These hooks must be set where you have seen ucks feeding or you're wasting time; they should not be aited until just at dusk, since otherwise you are liable to itch feathered rubbish like shags, or birds such as the wild wan.



HOOK SET TO CATCH WILD DUCK

Wild duck can sometimes be enticed to the hooks you have set for them, or within easy range for shooting, by "calling" them. Americans use a bit of wing bone to make a duck call, but just as good results can be obtained in the following way:

Get as close to the edge of the water as possible but keep under cover; once the birds have seen you the game is up as far as that particular flock is concerned. Smack your thigh with the flat of your hand a few times, to imitate the clapping of wings, then hold the nose between the finger

ıd thumb, cup the hand over the mouth and imitate the 'Iawnnk, hawnnk, hawnnk" of a duck. It takes practice to ·t the right note and it cannot be done without holding the ›se. Don't overdo the calling, especially if they are coming wards you without any further encouragement. If they seem bit indifferent, try to put an appealing note into your call.

Another method, when you have secured a few ducks, is tie the bodies to stakes in shallow water, to act as decoys, ith forked sticks to hold up the heads. Duck flying past ·e liable to come down and join what they think is another ›ck, but the wild duck isn't easy to fool and the decoys ust be fixed in as life-like an attitude as possible.

Don't waste time throwing stones at small game; you .ight not score a hit in a thousand throws. The aboriginal :ldom wastes time on stone throwing, so copy his method of ıtting some sticks of a tough and heavy wood, such as mulga, bout eighteen inches long by an inch thick. They should ave a slight bend and should all be of the same weight and ıe same "feel" when held in the hand ready to throw. Throw ıem with a quick swing of the arm ending in a flick to ıake the stick spin, boomerang fashion, as it leaves the and. As it spins the stick will cover a circle of two feet, ıus greatly increasing the chance of a hit. Use it on rabbits, ares and wallabies as they jump up in front of you, and on irds as they rise after feeding. To hit wild duck, one of ıe most difficult of all feats, take up a position on a creek hannel where the birds fly up and down; a place where ıere is timber on both banks, leaving only a narrow opening ›r the birds to pass through, is especially good. In addition › the throwing sticks you require a little boomerang cut rom bark, wood or tin. When a flock of duck is quite close, ırow the boomerang straight up, at the same time giving a hrill whistle—imitate the duck hawk if you can. Seeing omething soar above them and thinking that a hawk is about › dive on them, the birds will bunch and come down, to skim

the water past where you are standing. Let fly at them with a throwing stick, aiming at least twenty feet ahead of them. Your surprise at the way in which that stick usually seems to pass right through the flock without touching a duck is only exceeded by the amazement which you feel if there is a thump and a splash and you see a duck floating on the water.

I have been asked if it is possible, in an emergency, for a white man to improvise a spear and wommera and to spear game, aboriginal fashion. The answer is "Yes", provided you come from a family noted for longevity and are prepared to devote years not only to the practice of aiming and throwing, but also to the making and balancing of the weapons. No improvised weapon will serve as a spear. A spear must first balance at a point about two-fifths of the total length back from the point; it must also be of the correct weight for its length and be neither too stiff nor too flexible. Spear-making and throwing is a real art and I advise the bushcraft student not to bother with it when there are other and more important things to learn.

It is nearly as bad with the bow. You need seasoned timber for a bowstave and there are only a few real bow-woods in the world; lack of suitable timber is an obstacle in most places, and where you can get it, there is the seasoning problem. This takes at least six months. Only Chinese bamboo and black palm will season sufficiently in a few weeks. Then there is the problem of making arrows which will fly true: it is quite a problem, believe me. The only exception is the tiny bow, made from any strong and flexible stick and used for shooting fish, but that is dealt with in another chapter.

Nevertheless, the bow is a splendid hunting weapon, silent and very deadly in competent hands. Americans like Howard Hill and Forrest Nagler use nothing else for hunting and have brought down the largest game animals with a single arrow. Dr Saxton Pope, Arthur Young and Edward Stewart White took their hunting bows to Africa and, in addition to bagging

ame such as wildebeest and eland, brought down fourteen ions. In America, some game reserves are set apart solely or hunting with the bow and in many other areas the archer-unter has special privileges. In South Australia members of he Archery Society have brought down wild pigs and wild oats; I also hunt with the bow. But, and it is a mighty mportant "but", before you can do this it is necessary to oin an archery club and to spend a year or two on target hooting before you try your hand at hunting. You also need good handbook on the making and care of archery tackle; good one for the beginner is *The Flat Bow* by Hunt & Metz; nore advanced books are Paul Gordon's *The New Archery* nd *Target Archery* by Robert P. Elmer.

In conclusion, it is my earnest advice to forget all about ative bows and anything and everything you have ever seen r read of native archery. Keep that boong bow which you r somebody else brought back from the Islands as a curio. f you go in for archery hunting, use the modern hunting rrow and the American flat bow; to compare the best of ative bows with our modern, scientifically-designed gear is kin to comparing a muzzle-loading musket with a high-owered rifle.

CHAPTER V

WILD VEGETABLES

OFTEN wild vegetables are the only emergency food available in the bush, but the choice of edible plants is full of pitfalls for the unwary. Among Army personnel we had one cast-iron rule to apply when anyone brought us some wild fruit or vegetable which he described as edible. "All right", we would reply, "let's see *you* eat it." It was somewhat drastic at times but it was a certain cure for those who take things for granted; once in a lifetime is enough to try eating a thing like a cunjevoi bulb!

In a small handbook it is impossible to give a full list of and describe all the edible plants of Australia and the adjacent islands; we can mention only the chief ones and lay down some rules which must never be broken. We will take the rules first.

The statement, so often and so carelessly made, that we can eat anything which birds or animals eat, is *not* correct. Wild pigeons can eat the berries off the strychnine tree and some parrots and cockatoos can tolerate enough prussic acid (found in many wild fruits and vegetables) to kill a man. The only safe guide for human beings is the monkey, which is not found wild in this country. Red colour in a fruit is often a danger signal in the bush but there are many exceptions to this rule, such as the native cherry, wild tomato, climbing and mountain species of pandanus, etc. The golden rule for all wild nuts, fruits and vegetables with which you

re not familiar is not to eat it unless you have to eat some-ıing, and then to carry out what Dr Herbert, of Brisbane Jniversity, has called the "four-hour test". First crush it nd smell it; if it has the characteristic smell of peach leaves r bitter almonds, this reveals the presence of prussic acid, very deadly and swift poison. If it smells all right, crush ome of it and rub it on the skin inside your elbow. If it oesn't raise blisters or make the skin red and sore, try a bit n your tongue. If it doesn't sting or burn and the flavour eems all right, chew a little, gargle the juice in the back of our throat, and spit it out. Now wait to see if your throat ecomes sore. If it doesn't, eat a *little* of it and wait for our hours, to see if any ill effects in the way of vomiting, iddiness, internal pains or purging follow. If there are no ll effects it *may* be safe to eat a quantity of it. It cannot e stressed too strongly that testing out unknown fruits and egetables is not a job for the amateur.

Here is a list of our commonest foolproof bush vegetables. Ve will start by dealing with the country which lies south f a line drawn from Coff's Harbour in New South Wales o Carnarvon in Western Australia. Wild vegetables are not ommon in this southern half of the continent and wild ruits are scarcer still.

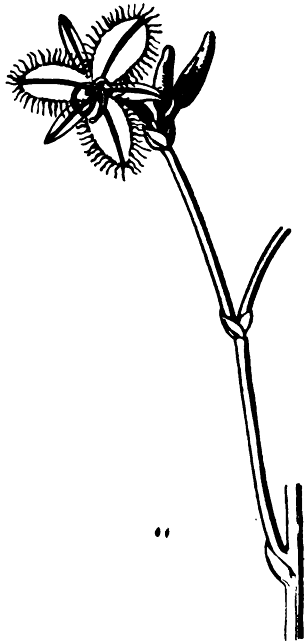
1. *Heart of grass-tree or yacca (Xanthorrhoea)*. An excel-ent vegetable with a sweet nutty flavour. Cut out the heart f young leaves (terminal bud) in the centre and eat the oft base of the white stalks. In the Western Australian grass-ree, which has many flower stalks in place of the single eduncle of the yacca, the edible part is a crisp, white coconut-ike substance below the base of the leaves.

2. *Bulrush root*. Pull up young sprouts, bake in the ashes, eel off the outer leaves and eat the centre. Good, something ike asparagus.

3. *Fringed "violet"*. Very pretty mauve flower with three etals, like a clover leaf, each fringed with delicate hairs.

Roast and eat the tiny, potato-like bulbs found below the ground.

4. *Pig-face weed.* Found mainly on coastal sand-dunes. Has three-cornered fleshy leaves the size of a finger and big mauve flowers. After the flower petals have fallen the flower stalk



WILD VIOLET. NEARLY ALL SPECIES OF THIS TYPE HAVE EDIBLE ROOTS

swells and assumes a waxy-yellow colour when ripe. Cut open this swelling; inside will be found tiny seeds in a sweet, syrupy juice. Somewhat like a fig to eat.

5. *Muntrey or muntree.* Small creeping ground plant, bearing a fruit exactly like a tiny apple in appearance, smell and flavour. Can be eaten raw but is better stewed.

6. *Quandong (wild peach)*. Small tree bearing a red fruit th a large, hard, wrinkled nut inside. Eat raw, stewed or ıde into jam.

7. *Sandalwood nut (bitter peach)*. Like the above, but the sh of the fruit is hard and bitter. Roast nuts in ashes before ting.

8. *Kurrajong*. This tree is used extensively for planting in eets and parks. Bears bunches of brown pods which split en to reveal yellow seeds inside prickly husks. Remove ısks by rubbing and winnowing, then crush seeds and boil porridge, or roast on a heated stone and crush, then use place of coffee. Flame-tree seeds can be used in the same ay. The drink brewed in this way is very palatable and freshing; I have often been accused of "ringing-in" real ffee by those who have tasted it!

9. *Spinach*. Use the leaves of the "Old Man" saltbush, inging nettle, milk thistle, lucerne or pasture clover.

10. *Wattle seed*. Pick the pods when ripe, extract seeds, ush them and wash in many changes of water, then bake the form of little cakes. *Warning*: Some people are upset eating the seeds of some species of wattle; if any aborigine still living in your district, get him to show you the trees hose seeds his people used for food; if no aborigines are ft some of the older residents may remember. Do *not* eat e seeds of that species of acacia whose seeds stink when ey get wet after they have fallen to the ground.

11. *Nut-grass*. A plant with very thin and wiry leaves; it is pest in lawns and gardens. Has a small bulb like a miniature ıion. Can be eaten raw or roasted.

12. *Chestnut yam*. Has a leaf like a single onion sprout, ith a similar hollow centre, but yellow in colour. Grows in ımp spots. Ripe when tip of leaf withers. Dig up the chestnut-ke bulb and roast it. Excellent flavour. This plant is very ard to find unless your eyes have been trained to search for .

13. "*Jewbuck*". Small plant with leaf like that of buffalo grass, but larger. Grows on sandhills. Has a small bulb which forms, a good, though watery, substitute for potatoes.

I am well aware that there are many more native vegetables than those listed, and that some of them are good and others passable, but please remember that I have given you only those which are considered to be foolproof, inasmuch as nobody should mistake them for anything that is harmful. Now a word of warning. You will be told that the natives used to eat many things, such as the nuts of the Macrozamia "palm" of Western Australia. They did, but only after a long and careful processing to remove the poisonous properties. They also ate nardoo "seeds" which are really the spore cases of a fern with a leaf like the shamrock which grows in swamps; when the swamp dries these "seeds" can be swept up by the handful. The aborigines ate them, however, only when they could get nothing else, for they contain little or no nutriment and have a very constipating effect. Leave them well alone. When digging up bulbs remember that the poisonous Cape tulip is now a pest in some parts of Australia: it has salmon-pink flowers and the bulb is enclosed in a sort of fibrous sac which looks as if it had been woven from coarse brown thread. Don't try to eat *that*.

Nobody has yet written a handbook on the edible native plants of southern Australia. Botanical handbooks do exist, of course, but all I have ever seen, with the exception of Maiden's *Useful Plants*, tell you everything about the plant except the one thing you really want to know—is any portion edible? Yet nearly all the necessary information for such a book has been gathered and lies buried in the archives of our museums, filed under the heading of "Plants used by Aborigines as Food". There is an opportunity for a botanist to use this information to compile a booklet, always provided that he or she uses simple, everyday language and avoids the scientific terms which puzzle some people. Anyone who

›ubts that this could be done should read the reports on e natural food resources of northern Australia prepared by e late Consett Davis, D.Sc. Anyone can understand his ›scriptions.

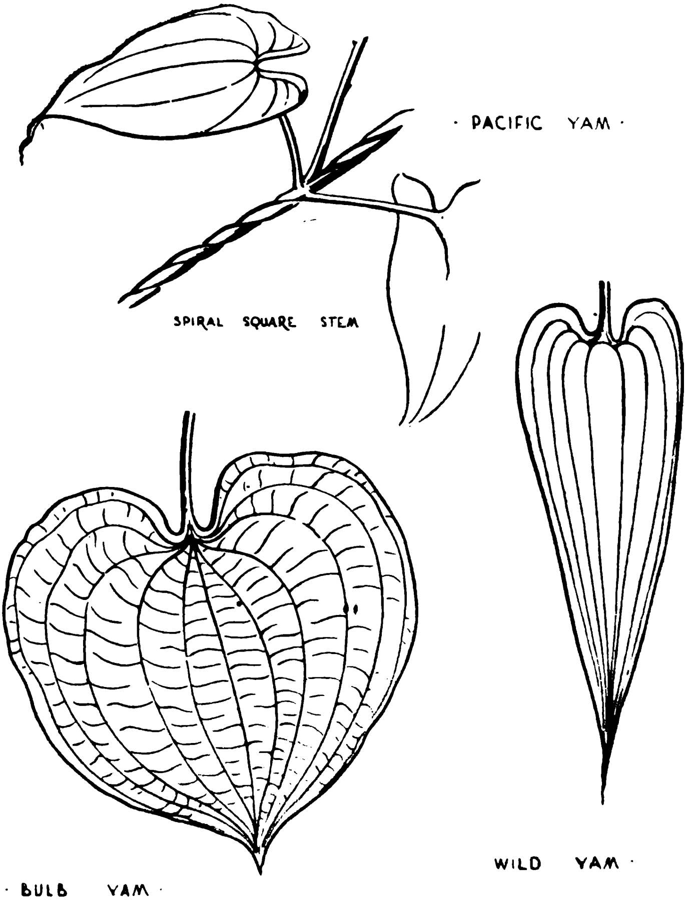
Once you move into Queensland on the east, north of lice Springs in the Centre or Carnarvon in Western Ausalia, the food plants increase in number; in places the ›rth is a land of plenty compared with the south. Around xmouth Gulf in Western Australia a bush grows in the ·eek-beds; it has heart-shaped leaves with what appears › be a green wart on them. The sticks are white-barked and ·om the parent bush long runners stretch out. Under these ushes and the joints of older runners can be found an edible iber shaped like a swede turnip; it is quite as good as a veet potato. On rocky ground, especially when it is pro›cted by fallen brush or prickly bushes, a convolvulus vine › found bearing big tubers, which can be located by moving ıe loose rocks. A trailing vine grows on the sandhills of ıe Ninety Mile Beach south of Broome; it gives out roots t the joints which are thin and fleshy and can be baked, eeled and eaten. Lily swamps are common north of Broome; ıe young stems and leaves of these lilies, as well as the eed-heads, are edible. Some species have an edible bulb lso, found below the main stem when the swamp is drying. n the shallows near the banks of some lagoons a sedge grows vhose roots carry small edible tubers; the best of them will ısually be found where the wild geese and brolgas (native ompanions) have been digging to get at them. Pig-weed portulacca) is common; the leaves are eaten raw or steamed. 'he bulrush is found in this area and so is the water plantain, vhose heart-shaped leaves on long stalks project about four eet above the surface of the water. The leaf base is edible. The seed-cases of the bottle-tree (baobab) grow to eight nches in length and provide food at all stages of growth, ›ven after they have ripened and fallen to the ground. When

green, the pulp around the seeds is eaten; when ripe, you eat the seed-kernels, which are found embedded in a cocoa-like powder within the fruit. Many of the ground orchids in this area have edible tubers on their roots.

A number of fruits are found in this area including the wild passionfruit, which is similar to the domestic variety, but much smaller, and the fruit, yellow when ripe, is carried inside a hairy network. There are wild figs, some of which are good but others resemble a superior kind of wood masquerading as a fruit. The koonkerberry is a shrub with thin spines and a milky juice carrying a sweet little berry like a sultana grape. The native orange is a tree up to twenty feet high; its leaves droop and are narrow and yellowish in colour; the fruit is green and marked with a few red flecks when ripe. The native pear is a climber with woody stems and a milky juice; seeds from the green pods are eaten. Wild cucumbers are fairly common; they are too like the domestic variety to need any description, but one species is so bitter that it is quite inedible. The native cherry is rare but good; the shrub is practically leafless and has flattened stems; the fruit, as in other species of native cherries, is found below the nut. There is a wild grape, very like the domestic types and very pleasant while you are actually eating it, but afterwards your throat feels very dry, though this seems to be the only ill effect. The lilli-pilli is a tree with round leaves about six inches across, which are tough in texture with strongly marked veins; the pear-shaped fruit is pinkish in colour. The Mangaloo is a deciduous tree with a corky bark, carrying purple fruits about one and a half inches long with a hard stone in the centre. The Java almond *(Terminalia catappa)* grows near salt water and can be picked out a long way off by the occasional red leaves among the green; the small but well-flavoured kernel is carried inside a large oval pod with winged edges. The sandalwood nut, already described, is found all the way north from

Exmouth Gulf; it can be distinguished at a distance by its rounded shape, bluish foliage and the red skin of its nuts. The combutta is a small bushy tree carrying a purplish-black fruit, inside which is a nut of good flavour with a hard shell. The aborigines of the Kimberley seem to eat the seeds of practically all the wattles in the area after pounding them and washing in repeated changes of water, followed by baking in the form of flat cakes. The flowers of the bluebell can be eaten, as they can when found anywhere else in Australia. There are many patches of Prince-of-Wales's Feather plant (Amaranthus) whose young leaves make good greens. The fan-palms of the area have an edible heart (terminal bud) in the centre of the young leaves and occasionally the wild asparagus is found in swampy spots. Unfortunately, the areas of good country in the Kimberley are separated by arid plains of red sand known as Pindans and in the pindan country it is almost useless to seek food; the rule is to get out of pindan country as quickly as you can.

Moving across the north of Australia through the Darwin, Arnhem Land and Gulf country areas—places which I have never visited—the food plants mentioned give place to those of the Cape York type. Big portions of the southern part of Cape York are wild and inhospitable regions of ironstone hills, mangrove swamps, mudflats, crocodile-infested creeks and sandhills, but the northern extremity is one of the areas of Australia richest in native foods. True yams, always easy to distinguish by the characteristic venation of their leaves (see sketches) are abundant, and so is the water-chestnut, a rush-like plant growing in swamps and easy to identify by the bamboo-like joints on its dark green stems. At the base of the plant is a large root very like a chestnut when baked. On rocky ground is found the "strawberry-leaf" vine, which climbs like a yam but has leaves like a strawberry; its beetroot-shaped roots make very good eating when baked. In the jungles are many edible fruits and nuts; game and



YAM LEAVES SHOWING TYPICAL VENATION

fish are abundant. It is easy for anyone to learn the edible plants of this area, as there are many aborigines left at the Cowall Creek Mission.

Going down the Queensland coast south of Cooktown the typical food plants and fruits of the Pacific are found, especially where Kanakas used to camp in the days of coloured labour on the canefields. An excellent handbook to use in this type of country—and almost anywhere else in the Pacific Islands, New Guinea, the East Indies, Borneo, Celebes, the Moluccas and Philippines—has already been published; as an Army manual it was issued to the members of the United States armed forces. It is *Emergency Food Plants and Poisonous Plants of the Islands of the Pacific* and was published by the Botanical Section of Harvard University. I have no hesitation in stating that it is the best book of its kind ever published. A fairly good booklet of the same type *Friendly Fruits and Vegetables*, was published in Australia during the war and issued to our troops. Since the booklets cover the subject so thoroughly, I shall be content to add some information to what they contain.

The great food plant of the tropics, especially along the coasts, is the coconut. Many people, however, have a very hazy idea of how to use it. For drinking, use nuts which are full-sized but quite green, with the shell inside quite soft, so that the top can be removed with a single slash of a sharp knife. It is a curious fact, not mentioned in any book I have read, that some palms carry nuts containing a far more palatable liquid than those grown on others, and these good ones can be located by the litter of empty nuts around their base, where natives have been using them to get a drink. If you like a sweet drink, add a little sugar to the water in the green nut; if you like it sour, squeeze into it the juice of a wild lime.

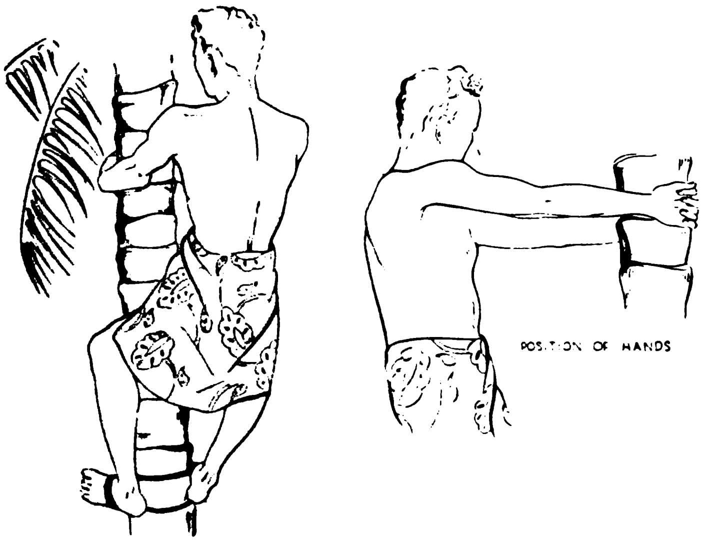
The best nut for eating is one which is a clear golden colour and is still attached to the palm; the husk is removed by

bashing it on a sharp stake stuck in the ground and the nut split by striking it with a heavy knife on the line which runs around it. The still soft meat inside is scraped out and eaten. Coconut cream can be made from the finely shredded meat from a ripe nut. Place a heap of this in the centre of a piece of the cloth-like substance found at the base of the palm-leaves. Fold the cloth and wring. This forces out a thick, creamy liquid which can be used in place of milk in tea, coffee or cocoa, as a sauce for baked taro or fish, or on porridge.

The old brown nuts that fall from the trees, which are also the ones sold in shops, are fit only for copra making when compared with the nuts described above, though of course the liquid in them, if any, can be drunk, and the hard white meat can be eaten. However, both are poor when compared with that from younger nuts. Unless you have no alternative do not destroy an adult palm to get the "millionaire salad" (terminal bud) in the heart of the leaves. Instead find some nuts which have sprouted and have shoots four or five feet long growing from them, and use the hearts of a few of these baby palms.

Knowing how to climb a coconut-palm is indispensable in the tropics. Don't try to swarm up the palm by wrapping arms and legs around the trunk; it is very exhausting work. Instead, carry with you, or make from the fibre which the palm itself provides, a rope about ten feet long and as thick as a lead pencil. Sit at the base of the palm with your boots off, your feet about fifteen inches apart and the toes pointed upward. Now wind the rope from the instep of one to the other and back again, finishing off each end with a couple of half hitches around the turns of rope. Stand up, clasp your hands together on the far side of the palm, hug the trunk with your chest and slide your feet up the trunk, soles turned inwards with the rope lashing kept taut. Now loosen the grip of your arms and stand up; you will find that the rope will

revent your feet from slipping down. Tighten the arms again, ift your feet once more, and up you go, with an action like hat of a frog swimming. On arriving at the top, which may e sixty feet or more above the ground, do not hold on to ny leaf whose tip points downwards, as those leaves often



ATIVE USING FOOT-ROPE TO CLIMB COCONUT-PALM

all at a touch. Instead, grip a leaf higher on the palm whose ip points upwards. Slash through the stems of the nuts you equire with your knife and let them drop. To come down, re- erse the process of climbing but don't try to slide, since f the pace becomes too rapid, you can put the brake on only t the expense of skin and clothing.

Don't try to catch nuts which somebody else has cut and et fall, as they descend with terrific force. It is also a good lan never to walk directly under a palm at night, for then

the ripe nuts are liable to fall and can smash your skull like an eggshell.

Queensland has two food plants not mentioned in the books; one of which is the Queensland nut or "bopple" *(Macadamia ternifolia)*. It grows in gullies and has leaves with serrated edges, quite like those of a banksia. The nut is about an inch in diameter and has a remarkably hard shell. The other is the bunya-bunya pine, whose seed-cones form every third year. The seeds from these cones are roasted before being eaten. Both these nuts can hold their own with any of the world's edible nuts as regards flavour and food value.

Cassava that has been scraped, washed thoroughly to remove the poison, and then dried (this is the tapioca of commerce) is a good substitute for flour; it will make both bread and cakes. When using it you must have some form of leavening and this can be brewed in a coconut. Bore out one eye in a ripe nut containing plenty of liquid and into this place two teaspoons of sugar, one of plain flour, a pinch of salt, six squashed raisins and twelve grains of rice. Shake up well and stand in a cool spot with the hole corked loosely with a twist of grass. The first nut often takes a long time to work properly, so when mixing the first batch of bread keep a little of the liquid and pour it into the next nut to act as a starter.

One of the best tropical fruits is the banana, but people who have not lived in a banana-growing district seldom have any idea of how it should be ripened; most of them think that the yellow bananas sold in shops are ripened on the plant. They have to be picked when still green but fully grown; you cut them off the bunch in "hands" of five or six. Dig a hole in soft soil and line it with banana trash (old leaves) and place a layer of bananas over the bottom, then more trash and more bananas to within a foot or so of the top. Fill the rest of the hole with trash and leave for a few days, then have a look at the fruit every day to see how it is getting on.

hen the fruit starts to turn yellow take it out and lay it on a elf to finish ripening.

Never try to eat green bananas raw; bake them and use as substitute for potato. In the same way a green papaw can baked as a substitute for vegetable marrow.

I have only touched the subject of bush vegetables; to deal oroughly with the subject would require a whole book. ıere should be enough here for the beginner, however.

CHAPTER VI

FIRE WITHOUT MATCHES

MORE nonsense has been said and written on the subject of lighting fires without matches than on any other, except, of course, the birth of the kangaroo. How anyone can have the nerve to discourse about something of which he knows less than nothing and is unable to give a single practical demonstration passes understanding. Yet scores of instances of it can be found in print. How can anyone tell, by reading what a man has written about a subject, if he could give a demonstration or not? Quite easily: it can be summed up in six words, and here they are: *The Age of Miracles is Past.*

This is no exaggeration; it would be nothing short of a miracle if you could light a fire in some of the ways I have seen described. Here is an example: "Sparks struck off the flint by the steel are caught on dry grass or cotton threads and are then blown into flame." It is doubly incorrect, because the sparks come from the steel and not the flint. The spark is a little speck of steel, heated to white heat when the steel strikes something harder than itself, and it flies off and does the lighting. Further, you can send a rain of those sparks all day long into dry grass, cotton, bark and similar stuff, but never will they ignite. In the Army we had a standing reward for anyone who could once make such materials catch fire, but it was never claimed.

Apart from the old style gunpowder, which is never seen in the Army nowadays, and highly inflammable vapours like

›se from petrol and alcohol, these sparks will light nothing cept tinder.

When bushcraft training first began in the Army, we were :ed with the problem of making tinder from substances ıich a soldier was certain to have with him or could find in : bush. It was absurd to instruct a soldier to "Take a little ltpetre or a chlorate of potash tablet . . ." as one book vised; if the soldier didn't have those chemicals with him and who does carry them about?—you might as well tell n to take the gold reserve of the Bank of England. We knew ıt tinder could be made without chemicals, but nobody :med to be able to tell us how to do it. We made the rounds the technical schools and the University; we consulted old :t-books from public library vaults, but drew a blank :ry time. Tinder making seemed to be a lost art. Then one n had an inspiration.

"Consult the éxperts," he said. We pointed out that we had :n doing that very thing.

'You haven't," he retorted. "You won't find them at the ıools and universities; they're down at the jail." So to the l I went.

'We've got the man you want locked up now," the super- endent informed me. "No matter how often or thoroughly search him, he can always light a smoke in his cell. Man- ıke's got nothing on him. I'll get him for you."

)ld Bob was very suspicious at first, but when he found why we wanted the information he took me out of sight l hearing of the jail staff and parted with all his cherished rets. He did more than merely talk about it; he demon- ıted everything as he went along, thereby giving an object son to *all* teachers of practical work, and it worked beau- ılly. That old man had been in and out of jail most of his :, but he did more for the troops than many of those who 'e never seen the inside of a jail. Thousands of soldiers had son to bless him when the matches gave out.

However, he showed us only how to use the flint and steel correctly, and how to make tinder from common substances. There still remained the problem of making fire by friction. I had done it with the fire-drill when in the Boy Scouts, and also a few times with the hand-twirling method of our aborigines, but that wasn't good enough. The job had to be simplified so that almost anyone could do it, given the right materials. It was a wonderful old bushman who solved that problem. Thanks to old Bob and that bushman, we were thereafter able to demonstrate all the various ways of getting a fire without matches, not once or twice, but day after day and year after year, under all conditions of wind and weather and with very poor materials at times. The fact that we did not have a single failure at any time, and were also able to teach hundreds of others to do it just as well as we could, shows that we had mastered the knack and that there is nothing to prevent anyone else of average intelligence and ability doing the same thing.

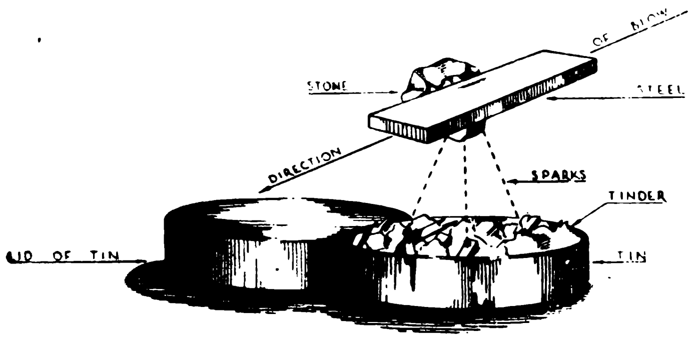
Let us describe the flint and steel method first. Flint may be unobtainable, but any really hard rock does just as well: quartz, chert, diorite, chalcedony, etc. For the striker you must use carbon steel, such as the blade of a knife, a piece of a file, a safety-razor blade, etc. Alloy steels will not do and neither will soft iron; the only substance found occurring naturally is iron pyrites, that hard, brassy ore often mistaken for gold by new chum prospectors.

An airtight box is necessary for the tinder. The ordinary boot polish tin is the best and most easily obtained thing to use, though some types of tobacco tin will also serve and you can make do with a bit of bamboo or a hollow bone, fitted with a wooden plug. Old, worn cotton cloth, washed thoroughly to remove any dirt, sweat or grease and then dried can be made into very good tinder.

First scour the tin thoroughly with sand, dry earth or ashes to remove any traces of polish. Then place it on the ground

with the lid beside it. Light a little fire and take a bit of the cotton cloth about the size of a handkerchief. Place the cloth on two sticks and hold it over the fire, keeping it from actual contact with the flames. This will make sure that it is thoroughly dry, and then will scorch it. When the material is smoking all over, let it take fire; it will flare up in a second. Just as the last flame is dying out, lower it into the tin, packing it down with the sticks, and at once clap on the lid. When the tin has cooled off, remove the lid and the black flakes which you will see are tinder.

To light a fire, place the tin on the ground with the lid off,



FLINT AND STEEL OUTFIT

hold the bit of stone between the finger and thumb of the left hand and hold it about three inches above the tinder. Now take the steel between the finger and thumb of the right hand and strike a light, quick blow with the sharp edge of the steel across a sharp edge of the stone, moving the steel parallel to the ground; do *not* strike downwards. A shower of sparks flies off if the blow is delivered in the right way and if one of them touches the tinder it will start to glow. Pick out the burning piece of tinder and at once put the lid back on the

tin—if you don't, the rest of the tinder may burn to ash in no time.

Tinder on its own will not burst into flame, so put the burning piece into what the bushman calls "bullswool"—dry grass or fibrous bark which has been rubbed and teased into fluff, coconut fibre, dry bullock dung or anything similar. Now breathe very gently on the burning tinder; it will glow like a hot coal and the surrounding bullswool will burst into flame. The record for this operation, performed by a Boy Scout in Western Australia, is six seconds.

What makes that bit of burnt cloth light so easily? Originally it was a mass of cellulose threads; you burned the more readily combustible elements out of it and reduced it to a mass of red-hot carbon filaments. These would have turned to ash if left in the open air, but at that point you arrested the combustion by putting the lid on the tin, thus excluding the air. Only those dry carbon filaments can ignite when a a spark touches them.

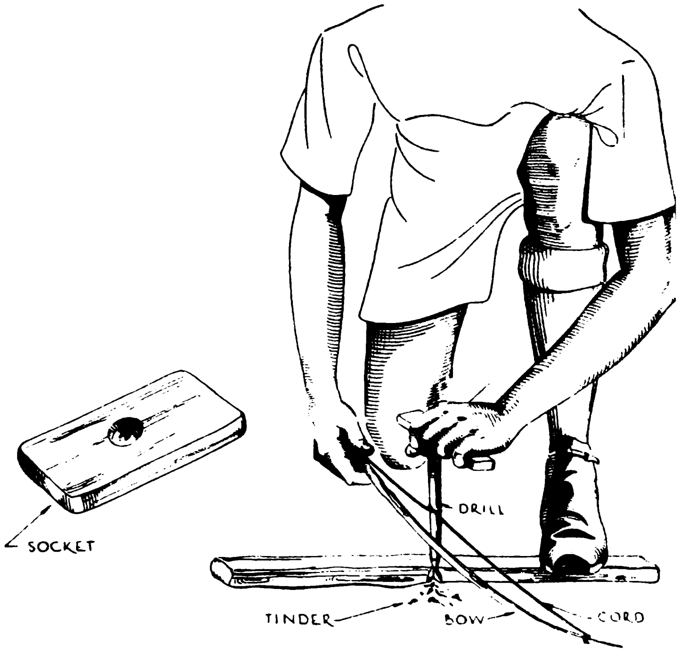
Substances which can be used in place of the cloth are wild cotton, taken from the ripe pods on the bush, thistledown, kapok (found growing wild in the Islands), or the brown fluff found at the base of the leaves of the Macrozamia palm, though the last-named must first be boiled in water to remove the gum and then be dried. These substances are first teased into a large ball of the lightest possible fluff, then lit and *at once* packed into the tin and the lid put on without the loss of a second. All of them burn like a flash and the combustion must be stopped at the right moment; do it too soon and the material isn't carbonized sufficiently to light with a spark; do it too late and you'll have ash only.

Yet another way of making tinder is to collect that large, white, bread-like fungus ("punk") found growing on dead trees and rotting logs. Break into little chips, dry them thoroughly and heat them on a sheet of tin held over a fire or

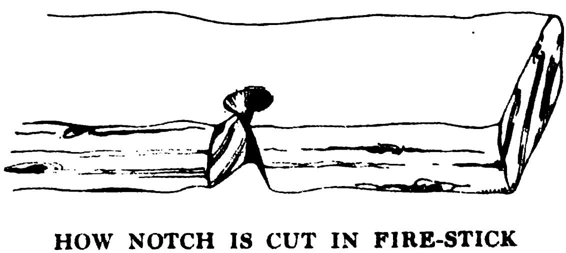
on a very hot stone; they first go brown and then start to glow. Rake them into the tin at once and put on the lid.

Like so many other things, we found that the secret of lighting a fire by friction lay in scrupulous attention to detail. Only certain woods can be used. In Western Australia the main ones are "snap-and-rattle" mallee, birdbush sticks, yacca flower stalks or thin water-roots which have been dried thoroughly; in South Australia they are yacca flower stalks, ecoma sticks, wild peach and white mallee; in Victoria, yacca stalks and some sticks from the underbrush of the tall forests; in New South Wales, the same plus lantana; in Queensland, lantana, milky pine, brown kurrajong, white cedar, pink burr, wild orange, cottonwood and some palm-leaf midribs; in the Indies, pohon pooti and pohon wahroo; in New Guinea, many of the rain forest trees with light, soft wood, such as bubulamana, and palm midribs. The main thing is to get a wood which is light in weight, cuts cleanly and is firm in the grain. It need not be absolutely dry but it must be dead, though not so old as to be brittle.

Beginners are usually told that the sawing and ploughing methods are the easiest and drilling the hardest. This is not borne out by experience; we found drilling the easiest by far. To make the drilling outfit, cut a stick of the right type of wood about six inches long by about five-eighths of an inch in diameter. Put a blunt point on each end; this is your drill. The base-stick is about a foot long by one inch thick, with two sides cut flat to reduce the thickness to about five-eighths of an inch. In the middle of this bore is a shallow hole on the flattened side, to receive the drill point, and in the edge put the most important thing of all, the notch. This is V-shaped, must be undercut and must go in to just short of the centre of the hole in which the drill-stick revolves. For the bow, cut a finger-thick stick of strong, flexible wood two feet long and fit it with a slack bowstring of strong cord. For the top bearing, get a lump of the hardest wood you can find and shape



THE BOW-DRILL



HOW NOTCH IS CUT IN FIRE-STICK

it to fit comfortably into your hand; in the centre of it bore a hole to take the top end of the drill. Lubricate this top bearing with soap, fat, lead-pencil scrapings or, if you can't get anything else, by rubbing one end of the drill on the sweat-glands on your nose. That end must always go into the top bearing; the two ends are *not* interchangeable.

To make a spark with this outfit, put the base-stick on the ground, hole upward, and hold it firmly with the left foot. Kneel on the right knee. Take one turn of the bow-cord round the centre of the drill-stick and put the lower end of the drill in the hole. Place the top bearing on the upper end of the drill, hold it with your left hand and keep it steady by putting the left arm round the outside of the left leg, with the arm on the shin-bone. Now move the bow to and fro parallel to the ground, pressing lightly but firmly on the top bearing. This makes the drill spin rapidly; brown powder gathers around the base of the drill and falls out of the notch on to a little pad of bullswool which you have placed below it; when that powder turns black, tends to stick together and gives off a smell something like burning sugar, unmistakable when you have once smelled it, you give a couple of very quick movements of the bow and lay it and the drill aside. You will now see that a little thread of smoke continues to rise from the heap of black powder. Breathe gently on this and it will glow; pick up the bullswool, fold it around the spark, blow gently again and you will get a flame.

After a fair bit of practice and given the right materials, you will find this easy enough; a description of the above can be found in many books. But the wonderful old bushman mentioned earlier in the chapter gave us the real secret, a thing I have never seen mentioned in print:

"Your object is to grind the wood to powder as quickly as possible and kick up all the heat you can while you're doing it, see?" he said. "So you give the drill a few turns to make sure she's working right, then you take a bit of hard charcoal.

crush it and put it in the bottom hole, or put a little pinch of sand in instead, to act as an abrasive, see? Then you start drilling again and there's your spark in a jiffy. See?"

We did see. To say that it acts like a charm is to put it mildly. We were soon getting a flame within twenty-five seconds of starting to drill, and on one occasion a Boy Scout whom we had taught did it in twenty seconds. None of us ever equalled that really amazing feat; I don't know if it is a world's record, but it should be.

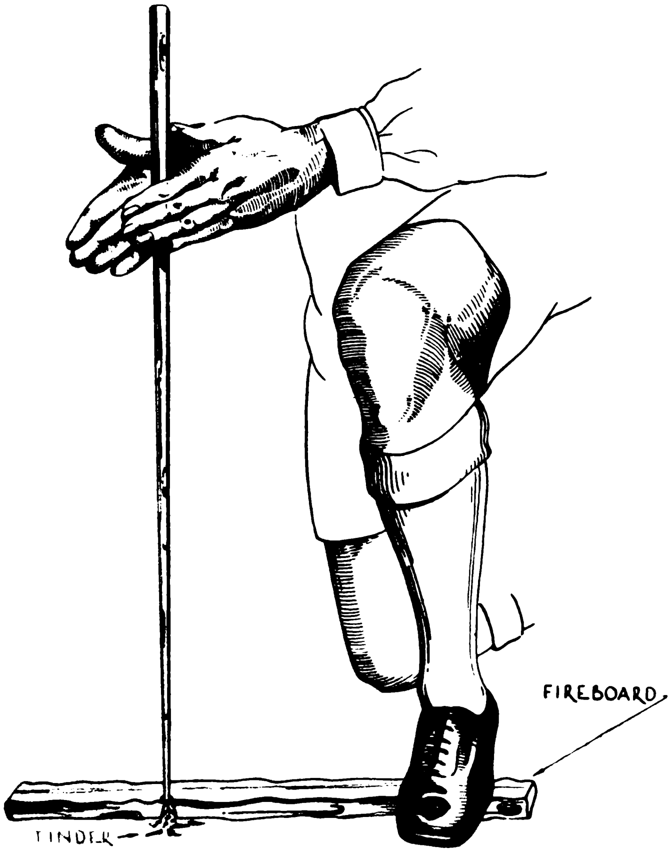
To do the job in the aboriginal way the bow and drill is replaced by a straight, smooth stick about three feet long, which is spun between the palms of the hands. Your hands slip down the drill as you do this, but when you near the bottom you make a swift snatch at the top of the drill and run down again. Four or five times up and down the drill usually does the trick. It is a bit harder than the bow-drill and can raise some fairly good blisters on the hands.

In the sawing method use the same base-stick, but this time cut a groove down the middle instead of a hole. Instead of a drill, you use a bit of hardwood shaped like a ruler and used like a saw above the centre of the groove. The powder containing the spark collects in the groove.

In the ploughing method, a stick like the drill-stick is moved up and down a long groove with an action like that of the blade of a plane; the spark appears at the farther end of the groove, among the shavings which collect there.

To make a spark in the "fashion belong New Guinea boy" put a split in one end of a bit of palm-leaf midrib and hold it open with a peg of wood. Put a little bullswool on the ground in a small hole and lay the split in the midrib directly above it. Hold it firmly in place with the feet. Slip a loop of split lawyer cane under the midrib of palm-leaf and saw rapidly by pulling on each end alternately, making sure that it rubs under the split portion. The spark collects on the bullswool.

These last four methods are *really* hard to carry out,



HAND-TWIRLING METHOD

especially the sawing with the loop of cane. But both the drilling methods will be found quite easy to accomplish if the pupil is given personal instruction by somebody who has thoroughly mastered it himself. This being the case, it is difficult to understand why so much nonsense has been said

and written about it, or about any other method of getting a fire without matches, for that matter. Even Horace Kephart, whose *Camping and Woodcraft* was for years the American camper's bible, gives very poor instructions for lighting a fire without matches and dismisses fire-making by friction as impracticable.

You also find a lot of erroneous statements about using the burning glass. Anyone can use a lens to burn holes in bits of paper or in leaves, but that isn't lighting a fire. You can set fire to such material if you have a really big lens, but who normally carries such a thing with him? To be practicable the method used has to be one which can be accomplished, even with a tiny lens, one not as big as a threepenny bit, such as a prospector's lens, or the eyepiece from a pair of binoculars. Such a lens will not burn your hand if you focus the sun on it, nor will it set fire to the head of a match. It won't mark paper. Yet it will light a fire if used in the right way.

The secret lies in the application of elementary physics to the problem. White or light-coloured surfaces reflect heat; it is therefore useless to try to light them with a small lens. But black *does* absorb heat and there you have the whole secret. Focus the beam on some black tinder and in two seconds, or even less time, a glowing spark will appear; the rest is merely a matter of a bit of bullswool and a few gentle breaths blown on it to get the flame. The only drawback to the burning glass is the very obvious one that it works only when the sun is shining.

Hand in hand with the art of making fire without matches goes that of lighting a fire in wet weather. To see this done under the worst circumstances, imagine yourself transported to the type of country where so many of our men lived, ate, slept, fought and died. Through the steamy green gloom of a tropical forest the tall columns of the trees rise to a leafy ceiling far above. All the trunks are festooned with a tangle

of lianas and the wicked hooks of the lawyer vine. Underfoot is a sodden mat of leaves and mud; all the fallen timber is nothing but a rotten sponge. Only too often the pitiless rain streams down, hour after hour. You might think that to get a fire going under such circumstances is an utter impossibility. It is, unless you know the tricks.

Many of the soldiers who fought in New Guinea and other tropic islands were trained in the jungles of Queensland, where there are two ways of starting a fire. The first is to find a ghittoe or "kerosene-tree" *(Halfordia scleroxyla)* whose wood burns green. When one of these trees is found (it is identified by the absence of root buttresses, by large, yellow-barked, twisted roots appearing above the surrounding soil, and by small dark green leaves somewhat like the fruit of a fig in outline) a slab is split off the trunk. You'll find it tough work to do this; ghittoe is one of the hardest timbers in the world. This slab should include some of the saffron-yellow heartwood. Split little splinters off the heartwood and stick them into the ground in a circle, with their tops touching, like the framework of an Indian tepee. Add larger and larger splinters over these fine ones, then apply a match to the very fine inner splinters, through a gap left for the purpose.

This type of fire should always be lit in a sheltered spot among the root buttresses of a big tree, since it is very easily blown out by a puff of wind when first lit. It is also of the utmost importance to stick the bottom ends of the splinters firmly into the ground when building this type of fire, because the wood won't burn if laid flat in the ordinary way. Do the job properly and you'll soon have a cheerful little blaze. Go about it in a slap-dash way and you'll do nothing but waste matches. Once you have mastered this trick in the Queensland jungle you will look for wood which burns green in the forests and jungles of other countries, and you usually find it. Often a lot of hard work can be saved by examining

the wood in the remains of fires lit by natives, and then looking for the same stuff in growing trees.

Another trick that can be used in the Queensland jungle, when kerosene-trees can't be found, involves the blue kauri pine. This is easy to distinguish from the brown kauri because the trunk of the former is mottled with bluish patches whereas the latter is dull brown. Having found a pine, see if it has a broken limb. Most kauris have at least one or two. Stand directly under the end of the broken branch and begin to kick the leaves away. In the mat of leaves you will usually find lumps of hard glassy resin which have dripped from the broken stump; they range in size from marbles to pieces as big as your head. Even when wet, a chip of that gum will light with a single match and flare with a hot smoky flame like that of burning rubber. A few chips will boil a billy; for prolonged cooking, feed small chips of the gum into the flame at intervals.

Both these methods can be used in the jungles of other lands; it is merely a matter of finding the counterparts of the Queensland ghittoe and the gum of the blue kauri.

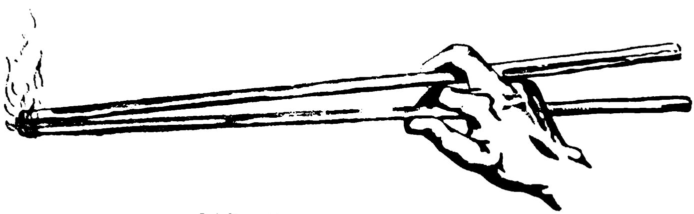
Almost any forest elsewhere in Australia has at least one timber which will burn green if laid in the same way as a ghittoe fire, and there is another expedient which you can adopt when the trees have a rough, fibrous bark like the jarrah. Pick a big tree and tear off strips of bark, even if the rain is pouring down and the outer layer of the bark is sodden. Reject that outer layer, tear the rest into strips and rub them into bullswool. Feed it into your fire a bit at a time and it will soon dry out a pyramid of sticks built above it and make them burn. This can be done just as well in the stringybark forests as in the jarrah country. Wherever the yacca grows you can get dry kindling by putting your hand under the crown of leaves and breaking off handfuls of the dead, dry ones. Spinifex will burn green. The nodules of hard, red glassy gum, found at the base of some of the big old blackboy

yaccas, will help make a fire burn if placed on the sticks so that the gum melts and drips down. So will a bit of beeswax from a hive of wild bees. In very wet weather it is useless to expect sticks to burn if they are gathered from the ground. Best results are obtained by breaking dead twigs off she-oaks or other casuarinas, or from wattles, and splitting them down the centre. The gidgee of western Queensland is particularly good for this purpose.

Fire-lighting under adverse conditions is an art well worth cultivating and I must place on record the fact that I have seen, *some* Boy Scouts and Guides do it with a swift efficiency that puts many a bushman to shame.

Another art worth learning is that of banking up a fire in wet weather so as to have hot coals ready for the morning. It's a simple job if you can get the big banksia cones (mungites). Rake the ashes of the fire into a circle and put all hot coals in the centre. Place your mungites in a circle like the spokes of a wheel, each with an end touching the coals. Fan until the mungites start to burn; leave for a time to make sure that they are well alight, then cover completely with ashes and place a piece of bark over the top to shield from rain. In the morning, blow away the ashes and a little fanning will start the mungites glowing. The ends of chunky hardwood logs can be used in the same way, and covered with ashes and slabs of bark when they are well alight.

If you have to carry fire from one spot to another don't try to do it with a single stick, unless it is a very dry gum-root



CARRYING FIRE-STICKS

or a bit of gidgee wood. Use two sticks and make sure that one end of each is well alight, then put the two burning ends together with the sticks lying parallel and wave them gently to and fro as you walk, unless a strong wind is blowing. This is the aboriginal way of carrying fire and as a test we once kept two good sticks burning in this way for six hours on a route march. It also helps you to keep warm when walking on a bitterly cold day, but you must be prepared for the flying sparks to burn a few holes in your clothing.

CHAPTER VII

CATCHING FISH

THERE are some scenes which impress themselves on the mind so indelibly that time does not seem to efface them. Here is one of them.

It was early morning and the tradewind was still a gentle breeze, which did little more than ruffle the water of the lagoon. I hoped that it wouldn't get stronger, because there were three of us in a canoe built for two and the water was lapping within two inches of the gunwales. My companions were a boy and a girl, aged fourteen and fifteen respectively. Their skins were honey-bronze in colour, no darker than those to be seen on many of our surf beaches, yet both were pure Polynesian. I wore nothing except shorts and a hat; their heads were bare and they were clad only in pareus of gaily-coloured print. Their fine teeth flashed in frequent smiles.

When we reached the fishing ground they gave me a paddle to keep the canoe from drifting away, then they slipped on their diving goggles, which were plain circles of glass, some four inches in diameter, set in copper frames, with a rubber face-piece and a strap to go round the head. Like most natives, they had no use for diving goggles with a separate glass for each eye. From the bottom of the canoe they picked up their fish spears, light affairs with bamboo shafts and a single steel point, the whole thing being about five feet long. The girl went over the side feet first, rested a hand on the outrigger to take a last deep breath, then vanished below the surface.

With the aid of a water-glass, a wooden box with a sheet of glass puttied into the bottom, I watched what she did. The water-glass cut off all ripples and reflections; I looked down into a blue-green world where the flower-like anemones waved their tentacles, the peacock-blue demoiselles darted among the corals, and the shoals of wrasse and Moorish idols passed like gorgeous butterflies of the sea. Directly under me the girl's slim body turned with the grace of a seal; with feet fluttering and the spear pointing before her she twisted among the coral niggerheads, peering under the ledges. Suddenly the spear shot out and a second later she broke the surface, with a coral cod impaled on the point of the spear. Her nose looked very white where it had been flattened against the glass and she took long, gasping breaths. As she came up, the boy dived in turn. The fish flapped against my bare feet as I slipped it off the spear point and let it fall into the canoe.

The pile of fish grew rapidly and after a time I asked them to let me try my hand at it. The boy handed over his glass and spear. I am not a good diver and it was an awful struggle to keep down; I had taken too much air into my lungs and I had to swim hard to avoid bobbing up like a cork. But what a fairyland I found myself in! Beneath an undulating ceiling which shimmered and flashed like quicksilver, I was moving through a gorgeous sea garden, with the clouds of tiny fish streaming ahead of me. At last I saw a big fish, lying under a coral ledge, its gills showing purple-red as they opened. I thrust the point of the spear at it, felt the thrilling vibration of the shaft which showed that I had impaled it, then shot to the surface, feeling that I could not hold my breath for another instant. Shrieks of laughter greeted me; I looked at the spear-point and to my disgust found that I had bagged an eight-inch sprat. It had appeared to be at least half a pound when I speared it, but I had forgotten that things look at least twice their real size when seen under water. However,

ılthough I did bag a big one later I'm ashamed to say how nany I missed.

When we turned for home our heap of fish weighted down he canoe until we had a scant inch of freeboard, and the wind vas rising, too. I held my breath until we felt the canoe ;rating on the coarse coral sand of the beach. We carried ıome over sixty fish, most of them over a pound in weight; ›ne fine cod weighed about fifteen pounds. We had set out o get fish and we got enough to feed several families in less han two hours. What would have happened if we had taken ›ut lines, hooks and baits? You can see the answer on jetties nd in anchored boats all around our coasts—people dangling ›aits in the water with little result at times. The bushcraft tudent must get away from the hook-and-line complex for ıe time being, or he won't catch many fish. The line must be bandoned in favour of the spear, the trap and the bow.

There are many types of spear and many ways of using ıem. I have already described how under-water spearing is one; this is already a very popular sport in some parts of ıustralia. Its chief drawback, when a man has to feed himelf, is that he must have diving goggles to wear and must e a good diver and swimmer; further, the spear is almost seless against fish which dart about. You have a reasonable hance of hitting only those fish which move slowly as they eed, or hide under shelves of rock on the reefs. In rivers, here the water must be clear if the spear is to be used, the sh hide in hollow logs, under snags or among rocks.

Strange as it may sound, there is little danger of sharks you are working in clear water and don't take foolhardy isks, but it is different where the giant groper is concerned. hese ugly brutes cannot be scared off by blowing air past ıe edge of the diving glass, nor can they be frightened by wimming *towards* them, as the shark can. The groper hides ı submerged caves in the coral and darts out without any 'arning. Natives have a very wholesome respect for the

groper. The best way to avoid him is to work only at low tide on the coral reefs and to remain in fairly shallow water, avoiding the temptation to go over the reef edge into the deeper water in pursuit of the large fish you can see there. When using the spear under water hold it under your right arm, pointing straight ahead; when striking at a fish, move the point to within a foot of it before making the final thrust and at the same time kick with your feet to avoid any recoil of the body, which often makes you fail to reach the target.

Do not make the spear more than five feet long, and have the shaft of bamboo or very light but strong wood, so that it will float. The point should be of light springy steel, a broken fencing foil is just the thing, about a foot long. No barb is needed.

The spear used from a boat, the bank of a creek, or when wading on a reef at low tide is a very different affair. It should be up to twelve feet long and have several points of stiff steel wire with small barbs. Some people like them with four points in a row, like a garden fork, and others favour up to a dozen in a circle. When using a spear from the bank of a tidal creek, pick a creek with clear water and go along it at low tide, looking under roots or shelves on the opposite bank. Don't look for fish but be on the alert for what seems to be a little bit of brown leaf or loose bark, waving to and fro. This may be the pectoral fin of a fish. If you see something of the kind, look slowly to right and left of it, to find the tail of the fish—if one is there. If you see it, look back at the fin again, and if a fish is there it will seem to materialize suddenly out of nothing. It has been there all the time, of course, but, like the curlew's egg, you have to stare hard before the well-camouflaged object stands revealed.

Now lower your spear point slowly and carefully into the water and move it towards the fish. Do not attempt to sight down the portion of the spear above the water, but along that part of it which is under the surface, beyond where it

water tortoise. Kill it by cutting off the head; bake in the ashes upside down. Then split the shells apart. The guts will be found in a separate compartment; meat is at the base of the legs. The flavour is excellent, but the meat is a bit tough.

Baking bread. The simplest method of bread making is the twist. Cut a green stick about the size of a broom handle, remove twelve inches of bark from one end and place this end over the fire to heat the wood. Add some salt to self-raising wholemeal flour, mix well, add a *little* water and knead into a very stiff dough. Wind this in a spiral around the hot stick, the turns spaced about a quarter of an inch apart, and turn slowly over a bed of hot coals until nicely baked right through. If the innermost layer should still be doughy when you slip it off the stick, it shows that the wood of the stick wasn't hot enough when you wound the strip of dough on it.

Damper. This is the most important item in all bush cookery. Carry with you a bit of light duck or rubberized cloth, a piece of old Army groundsheet is good, about eighteen inches square. On to the centre of this tip a heap of wholemeal self-raising flour and into it mix about a quarter of a teaspoon of salt. Now make a hole in the centre of the heap of flour, pour in a little water and start to mix the dough with a clean stick, fork or a finger. Keep adding water, a teaspoon or so at a time, and stirring until about two-thirds of the flour has been made into a very stiff dough. Now cease adding water and work the rest of the flour into the ball of dough, using both hands and kneading thoroughly. At the finish you should have a large ball of almost dry dough which can be flattened into a disk about nine inches across and a bit less than an inch thick. The fire for baking should be prepared about an hour in advance. On smooth hard ground clear a level patch about a foot across. On this light a big fire of dry, light timber and keep adding fresh fuel

as it burns down. When you have a big mound of ash, mix the dough as described. Now sweep back the ash into a ring, leaving a light coating of ash over the bit of ground which you smoothed, and on this place your flat disk of dough. Shovel the hot ash back until the dough is covered by a layer more than an inch thick. Leave for about twenty minutes, then try with a thin splinter of wood. When the splinter comes out clean the damper is done. Fan the ash away, slide a slab of bark under the damper and place it *on its edge* out of the wind to cool. Do not cut till cool. It should be like light cake or good scone in texture with a very fine flavour.

You will meet lots of people who assure you that the real damper is made without either baking powder or self-raising flour. You'll read about it, too. Some claim that you mix ash with the water to act as rising, others that you let the dough ferment before use. All I can say is that, like the Man from Missouri, I want to be shown, and until I am shown I won't believe it and shall stick to baking powder or self-raising flour. It is thirty years since I first asked somebody to show me how to make a damper with plain flour and water only. I'm still waiting for a demonstration.

You have no need to go bush before you try your hand at these forms of cooking; if you live in a city you can do it in the garden. The wife of a retired missionary who gave a lot of help with the training of troops used to do it in her garden, with the class seated on garden chairs. We brought the firewood and the stuff to be cooked; she did the rest.

CHAPTER XI

FOOD IN UNLIKELY PLACES

IN the Army bushcraft classes it was our policy never to argue with anyone who disagreed with us. Instead of arguing we would demonstrate. On one occasion a member of the R.A.A.F., who had made a forced landing in bad country in New Guinea, and who had been through a tough time before he was rescued, grew quite heated.

"These stunts are all right in theory," he said, "but where was there's no food except sago and prawns. How can you get through the trunk of a sago-palm with nothing but a sheath-knife, or catch prawns without a net?"

Such a statement couldn't be allowed to go unchallenged, so after a bit of trouble we were able to arrange a trip to country similar to that in which he had been stranded. It was the old story. Food was there, but in what an untrained man would regard as very unlikely places. The area was an alternation of strips of jungle and swamps. In the swamps were water-lilies with their edible seed-heads, shrimps hiding in bunches of water-grass, witchetty grubs in the trunks of dead sago-palms, wild duck nests in patches of reeds and on the rises a small wild yam. The airman was soon convinced. Another man, this time a member of the R.A.N., made the same statement about mangrove country, and he was also convinced by a demonstration. This chapter will be devoted to describing how a trained man can find food where the outlook would appear hopeless to an untrained one.

It would be difficult to find a more unpleasant area than among the mangroves fringing our coasts. Clouds of mosquitoes and those less dangerous, but far more irritating pests, the sandflies. descend upon you and give you no peace. Sweat pours from you in the sodden heat. You can move about only by climbing from one twisted root to the next; beneath you is gluey mud in which you sink to the knees. It is useless to search for drinking water there; neither mangrove roots nor trunks will yield water and one species contains a poisonous juice. Fresh water can be secured only if it rains or you can find a patch of higher ground where tea-tree saplings are growing. We usually found that these tea-tree saplings would yield drinkable water, even if growing on ground but a foot or two above sea level.

Yet mangrove swamps are a fairly good place in which to hunt for food. If you have a spear with you or can improvise one, fish can be speared in clear-water channels at low tide. On the mud, when the tide is out, you will find groove-like tracks; if these are followed they lead to large, cone-shaped shellfish. When roasted their meat is quite edible although of an unattractive green colour. By groping in the mud of channels at low tide, very large cockles can be found. They are not nice to eat but are sustaining. Here and there you will find burrows from which, after a lot of exasperating failures, a giant green crab can be hauled with a strong hooked stick. That crab is really a delicacy, but it can use its huge claws very swiftly. Judging by the way they crush a stick, they could nip off a finger with ease. These crabs can be caught in numbers by tying the white meat (adductor muscle) of a giant clam, or any other tough bait, to mangrove roots at low tide, using lawyer cane or jungle vine for lashing. Return after the tide has flowed and has ebbed again, poke in the mud below the bait with a stick, and any crabs which have hidden there will at once stick up their claws. The old bushman who showed me this trick wouldn't bother about

crab bodies. As soon as his probing stick touched a crab he would make a swift snatch with both hands, break the claws off with a backward wrench and drop them into his bag.

"There," he remarked, "a couple of dozen nippers make a feed for a man and the crab runs off and grows a new set. Ain't that an economical way to work a crab claim, eh?"

On many mangrove roots at low tide, especially along the creeks, you will find clusters of small but very palatable oysters. The most surprising source of food supply in the mangroves is found in dead and half-rotten logs. Split them open and you will find them riddled by the so-called teredo "worm", which is really a shellfish and no more a worm than an eel is. The long, jelly-like bodies are watery and have a flavour faintly like an oyster. In some mangrove areas birds like the cormorant make their nests, which are difficult to reach and contain eggs only in the breeding season. The eggs are very rank and fishy but can be eaten.

In the freshwater swamps, find a place where the water-grass grows thickly, bunch each tussock together with the hands, tear it up and throw it ashore. If the tussocks are then pulled apart small shrimps will be found hidden in them. They make a meal if you can get enough of them but it is better to use them as bait to catch something bigger in the way of a fish.

Prawns can be caught at night with a flare and a net woven of split cane, like a tennis racket with slack strings. They can also be caught by putting a lot of very bushy boughs into the water overnight and dragging them out next morning. Most of the prawns escape but you can usually bag a few of them. If you carry a small fish-net of very fine mesh with you, shaped like a cone, and stake it across a channel leading from one pool to another, with the opening facing into the current, it will catch quite a lot of prawns and some scale-fish as well. It has to be set overnight. Such a net rolls up into a tiny bundle and weighs but a few ounces; the

pygmies* of Dutch New Guinea make them of split cane. They work better if they narrow to a small opening and then widen into a bag with a drawstring, like the purse of a trawl.

To capture the freshwater tortoise use a hook and line or adopt the trick which you will often see children using round the ornamental waters in parks. Stand on the bank and clap your hands smartly; any tortoise near by usually pokes its head above the surface. Don't try to grab them as they swim away; instead, slip your hand under them and throw them ashore.

In many permanent waterholes in Australia a big freshwater mussel can be found by groping in the mud. It is almost revolting in flavour, only a lot of curry powder can disguise the taste, but it is sustaining. In the north a much smaller mussel with excellent flavour can be found by scratching in the sand at the edge of pools along the rivers. In the Kimberley and adjoining districts a small freshwater crab can be found on the edges of billabongs: search for small burrows with pellets of mud outside them.

Warning: Cook all freshwater shellfish, shrimps, prawns, crabs and crayfish very thoroughly, especially in the tropics. They harbour liver-fluke.

A hornet's nest is about the last source of food you would think of, but aborigines regard one as a delicacy. The big comb hangs from a limb, often quite close to the ground, covered with very large and alert yellow hornets with vicious tempers and amazing stinging powers. Reconnoitre the nest from a safe distance, then get a long stick and tie a bunch of dead grass or dry pandanus leaf to it. Set this alight and then advance on the nest up the wind, so that the smoke will protect you if the hornets attack. The first lick of the flames singes all the wings off the hornets and they drop to the ground. Knock the comb down, toast it on both sides like a

* These people are not true pygmies; they are negritos of short stature. True pygmies are found in Africa.

slab of bread, then pick out the roasted grubs and eat them. The flavour is something like that of witchetties but not as good.

Finding food in semi-desert country. Set light to clumps of spinifex where there is no danger of starting a bushfire, letting them burn against the wind. Stand by with a stick to kill anything which runs out. You may burn a hundred tussocks and see nothing but a few beetles; on the other hand, you may get a marsupial rat, lizard or snake from the first one. It is all a matter of luck.

When a fire has cleared a patch of ground, go over it carefully for the burrows of kangaroo rats, rabbits, and anything else which lives in them. If you want to waste time and energy, try to dig something out by shovelling blindly. If you want to get something to eat copy the aboriginal woman's method. She never tackles this sort of job without a long, pliant stick as well as her digging stick. When a burrow is found she inserts one end of the long stick with great care, twirling it with her fingers to make it go round the bends. When it has been pushed in as far as it will go she starts digging, following the guide-stick. In this way she never loses track of the burrow. Before starting to dig out rabbits aborigines always hunt for and block the escape burrows; nothing is so exasperating, after you have been digging for an hour or so, as the sight of rabbits popping out of an unblocked entrance and racing away. Whenever aborigines come to a fork in a burrow, they always block up and mark one branch before digging farther, leaving the blocked one to be dealt with later. The stick is pushed ahead of them all the time. When they feel the guide-stick touch a rabbit they take another stick with a fuzzed end, poke it down, twist it until it has a good grip of the skin and fur and then haul it out. You can get rabbits out of burrows or hollow logs in the same way by using a bit of fencing wire with a wet tip.

When you are hunting for food on rocky hillsides carry two sticks, a long one to use as a lever for rolling rocks aside and a short one for a club. Usually your catch is confined to snakes and lizards, and it is a good plan to do this sort of hunting early in the morning when everything is cold and the reptiles are sluggish. Later on in the day, when the air has warmed up, they can move like greased lightning. Under stones on hillsides, if all else fails, you can usually get enough ant eggs for a meal. You need a tiny brush for the job, made from your own hair if need be, and a little bit of bark. Sweep them up as if using a midget dustpan and broom, brush any dirt away and eat raw. Flavour is floury, sweet and nutty.

This little pan and brush can be used to gather edible seeds. It would be an almost hopeless task to gather a quantity of these tiny seeds directly from the plants, but fortunately you have an ally in the harvest ant. These busy little insects gather seed over a big area of ground, carry it to their nest and place it in a ring around the entrance. Go from one nest to the next, sweeping up the tiny grains; when you have gathered sufficient seed, winnow it very carefully to remove husks and any light foreign matter, then wash in a pan with a swirling motion, similar to that used in gold washing, to separate sand from seed. Now grind the wet seed to a paste between two hard, flat stones, pat into little flat cakes and bake on a hot stone. It is most important to do the grinding very thoroughly, or a lot of the seed will not be digested.

In some inland areas the wind collects seed for you. On areas of grassland the way in which the dead stems are lying shows the direction of the prevailing wind. Go to the leeward side of the grass patch and you will find the seed lying in wheel ruts, hollows, against stones or tree roots. Sweep up and treat as you did with the seed which the ants had collected.

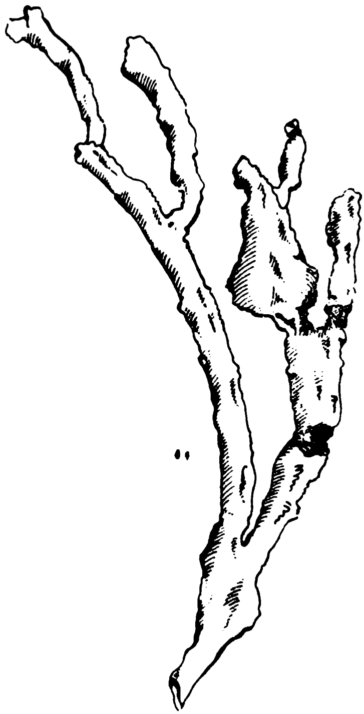
Frogs' legs are delicious; in America and France they are

regarded as a great delicacy. To catch frogs at night dazzle them with a strong light as they squat on logs, stones or lily leaves, then move your hand up *behind* them and grab. To catch them in the daytime find a patch of dense reeds or rushes in a swampy spot beside water and light a fire so that the smoke will blow through the reeds. Thinking that the reeds are on fire, the frogs jump out and make for the water. Grab them as they go past. You can also find them under stones, logs or slabs of fallen bark around the swamps.

In the tropics, from November to March, turtles come ashore on sandy beaches to lay their eggs. There are three species of turtle: the huge and sometimes savage loggerhead, the hawksbill and the green turtle, the last-named being the edible one. You can easily distinguish all three: the loggerhead by its size; the hawksbill by its parrot-like beak, with the upper jaw hooked over the lower, and its overlapping shell plates; the green turtle has a lizard-like head and its body plates meet at the edges without overlapping. It can be harpooned in the shallows or turned on its back when it comes ashore at night to lay. Turtles make tracks like those of a tractor. To locate a nest follow these tracks and wherever the sand seems to have been disturbed and then flattened again, probe with a stick. If the end comes up with yolk on it, you've found the eggs. They are quite good to eat but the whites will never set, no matter how long they are boiled. If you are finicky, scramble them. The meat of the green turtle is fit for a banquet; nothing on earth can compare with it. Kill the turtle by cutting off the head after you have turned it on its back, split the two halves of the shell apart and cut steaks from the meat around the base of the legs.

The edible seaweed is found along big stretches of our coast. In appearance it is thick, translucent and of a yellow-brown colour. It is gathered, hung in bunches to dry and stored until required. To use it, soak in fresh water until

it swells to its original size, then simmer gently until dissolved, strain and allow to cool. It will set into jelly. It can be flavoured with fruit juice and sweetened to use as a dessert, or poured over cooked meat to make brawn. This jelly is the agar-agar of commerce.



EDIBLE SEAWEED

When travelling across any sort of country except true desert, where you find nothing because there is nothing to find, the worst thing to do is to travel until you feel hungry and then start looking for something to eat. Incidentally,

that is what a white man usually does. As a result, many more hours may elapse before he does find food. It is best to copy an aborigine on a walkabout; his technique is entirely different. He wants to reach a certain spot and he will get there eventually, but seldom does he make a beeline towards it. Instead he makes the route and the time taken on the journey secondary considerations; he concentrates on finding food, no matter how many detours it involves. He also does not scorn the smallest morsels. In one place you will see him turn aside to gather the seed-heads from a grass patch; he removes the husks by rubbing them between his hands, winnows them by blowing and then eats them. At another spot he turns aside to get a witchetty or two from some wattles. Half a mile farther on he goes over to a small bushy tree and picks up a few sandalwood nuts.

If he copies these methods by being on the lookout for something edible all the time, and by not waiting until he feels hungry before seeking food, the good bushman will feed himself where the untrained man starves.

If you have an aboriginal companion in the bush never let him go off on his own to find something for the pot. Go with him, study his methods and then try your hand at it. Many so-called bushmen prove to be very helpless without an aborigine to do the hunting for them. In *Madman's Island*, which is one of the best descriptions of "living all same blackfeller" ever written, Ion Idriess admits quite candidly that, although he had often been out hunting with parties of natives, he had never tried his own hand at fish spearing until he had to learn the hard way while marooned on the island.

This habit of always keeping an eye open for something to eat in the bush is soon acquired; thereafter it becomes second nature and you do it without thinking. When you are training others, however, show them what to do, make sure that they

have mastered the lesson, then refuse to share your catch with them if they have failed to find or catch anything, unless, of course, they have no food of any kind. I know this sounds mean and selfish, but if you don't do it, you soon find yourself saddled with the job of hunting up tucker for most of the party. It is indeed a case of being cruel to be kind to make your pupils do their own food hunting.

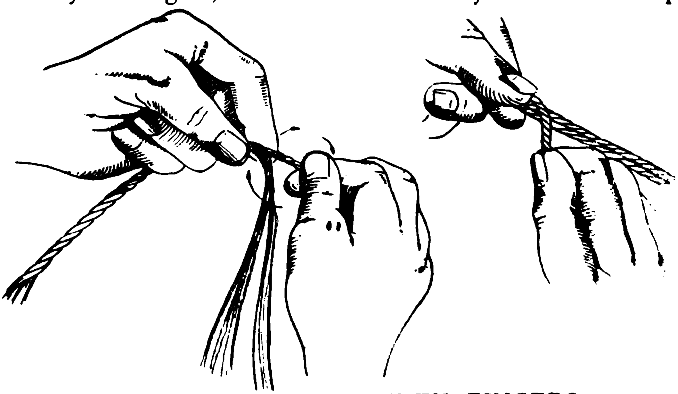
CHAPTER XII

LINES, CORDAGE AND THATCHING

BOOKS of this type usually devote a considerable amount of space to the making of cordage and twine and the building of bush shelters. There is a good reason for it; those who live in the bush know how indispensable both rope and string are, while the ability to build a weather-tight shelter is of such obvious importance as to need no stressing. Unless you can find fibres and spin them into any size of string or rope you need, or can build yourself a shack from any materials at hand, you aren't a real bushman.

Every district and country has its fibre plants; it might be the Tolmer grass of the Coorong in South Australia or the inner bark of the pohon pooti tree (hibiscus) of the Indies; the banjine of Western Australia or the coconut fibre of Polynesia. If you don't know what the fibre plant of your district is and nobody can point it out to you, it is your job to find it. (Usually it is a hibiscus.) Go from one species of plant to another, cut through the bark close to the ground, run your knife under the bark in an upward direction until you can grip the piece with your fingers, then pull upward. If a long strip of bark comes off, tear the inner layer off and try it for strength. If it is so tough that it threatens to cut into your fingers without breaking, you've found what you require. If no small trees or shrubs have such an inner bark, look for sedge-like plants with long leaves, growing on sand-hills or near swamps and try the strength of a strip of their leaves.

When you have found a bark or a leaf containing strong fibres, scrape it with a blunt knife to remove all soft plant material and allow it partly to dry. Then make up three strands of the material, hold their ends between the finger and thumb of the left hand, take the top strand between the finger and thumb of the right hand and twist it *away from you* by moving the right forefinger from the tip of the thumb to its base. Now bring this twisted strand towards you and pinch it between the finger and thumb of the left hand. This brings the next strand to the top; twist and lay it in the same way, then the third one. The first one is now on top again; twist and lay it once more. The movement soon becomes as automatic as that of a woman when knitting, and under your fingers, at the rate of twenty feet or more per



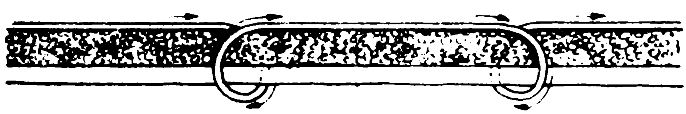
LAYING UP TWINE WITH FINGERS

hour, the string is laid up. As you near the end of a strand, include some more fibres and be sure to keep the strands of equal thickness. You can make anything from a fine fishing line to a rope half an inch in diameter in this way. If you cannot follow these instructions with the aid of the diagrams, hunt up a seaman among your friends, produce some binder twine, and ask him to show you how to lay up yarn.

In practised hands this hand-laid line can be almost as smooth in finish as stuff from a factory. In Army bushcraft schools one test consisted of gathering fibre, laying up a line, improvising a hook from a splinter of bamboo or hard-wood and catching a fish with it. In the tropics lawyer cane or thin jungle vine is the great substitute for rope.

It is well worth while to know how to lay a waterproof thatch, especially in the tropics. It isn't so bad to be without cover in the south for a day or two, even in midwinter, but you must have shelter during the wet season in the north. We will deal with grass thatching first, carried out with any long, straw-like material, be it grass or rushes, reeds or yacca leaves. It is simple to estimate the amount needed for your first attempt at thatching: you cut as much as you think you will need for the job and pile it in a heap. Cut some more and build a bigger heap alongside the first one. You will then find that you have from one quarter to one third of the quantity required! If the material is green let it wilt; if it is dry damp it slightly. Measure the average length of the grass stems, deduct four inches for overlap, halve the remainder, and that is the distance at which your battens have to be spaced. For example, if you were using rushes averaging nineteen inches in length, you would space the battens seven and a half inches apart. A thatched roof should never have less pitch than forty-five degrees.

When laying thatch of this type bunch the material into small sheaves and place them side-by-side along the bottom

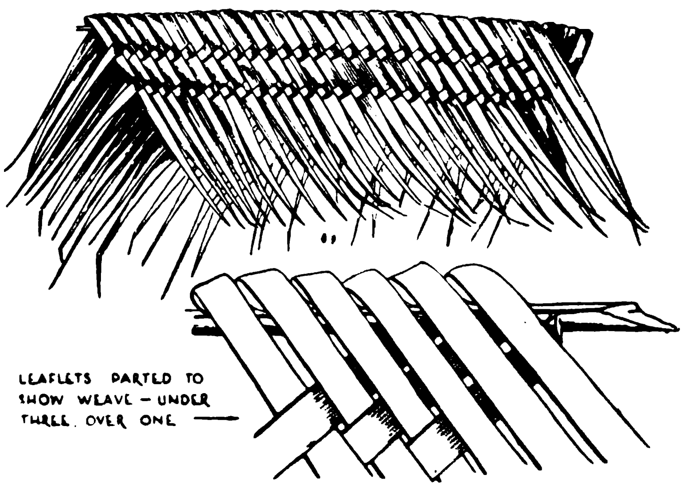


SHOWING DIRECTION OF SEWING THREAD IN THATCHING

battens. Using tarred string or very thin jungle vine, sew this layer to the lowest batten with an over and under stitch

(see sketch). Now sew the same layer to the next batten. Then lay another row of sheaves, with their ends overlapping that second row of stitching, and sew that lot to the third batten. The next row covers the third line of stitching and is itself sewn to the fourth batten, and so on up to the ridge. The ridge-capping is made of sheaves bent in the form of an inverted V and sewn to the top battens.

To make Polynesian thatch cut green coconut-palm leaves in half and reject the butt half. Now lay each half-leaf on the ground, take the leaflets growing on one side of the midrib, bend them across and pass each one under a leaflet on the opposite side. Work right down the leaf in this way, then go back to the start again, pick up each leaflet which was passed under the opposite one, take it over three more then under one again. An alternative to this is to take it



PALM-LEAF THATCH, SHOWING WEAVE OF LEAFLETS

over three after bending it over the midrib and then under one, over three more and under one again. This produces flat

ut also you can hear better. Sounds like dogs barking, axes eing used, lorries travelling in low gear, and so on, often ise clearly to the ear of the man on the hilltop, whereas ıe one down in the gully doesn't hear them at all.

When you are trying to locate the source of any sound, ıch as the shouts of someone who may be lost, the call of bird or the chirp of an insect, roll up a map or a piece f thin bark to form a megaphone-like funnel. Put the small ıd to your ear and point the other in the direction from hich the sound seems to come; move it about until the ɔund is clearest and loudest. To reply to distant shouts ansfer the funnel to your mouth and, still pointing it ›wards the source, call slowly and clearly, telling the other arty to stay where they are until you arrive. When you re out in the bush, always keep your eyes and ears on the lert for the recognized distress signals of three rifle shots, ıree coo-ees, three fires, three smoke columns, three mirror ashes or anything else. If you are replying to a mirror ash, move until you get a leaf, stick or anything else in ne with your eye and the other flash, then flash your own ıirror across it. Even a finger held out at arm's length will o, especially in the case of a searching aircraft; it ensures ıat your flash will be directed at the other party. Always be ıreful not to do anything yourself which can be construed s a distress signal, such as burning three fires in a row.

The surest way to get lost at night when you have no well-arked track to follow is to carry a lantern "to see the ay"; you often lose yourself in a circle of light. Also, if ɔu walk out of a brightly-lit tent or house and strike straight ff into the darkness you will easily lose your way. It takes ɔout twenty minutes for your nightsight to develop after eing in a bright light; if you have any doubt of the correct irection to take, use a bit of patience and wait until the ght in the sky seems to brighten before you start. Scarcely

one night in the year is completely dark; there is usually a little light.

To develop the type of observation needed to avoid getting lost, pick out something which you must be able to recognize from a long way off: trees which provide good firewood, water-trees, or those bearing an edible fruit. Look carefully at one of them from close at hand, then walk away, turning at intervals to look back at it, noting how you can still pick it out from the rest. For instance, its colour may be different from that of the surrounding vegetation, or its shape may be distinctive. Practise this until you can do it without a mistake, then reverse the process by trying to pick out that species of tree from a distance. See if you were right when you draw near to it. This little game can be practised from moving cars and trains, as well as on bush walks, and before long, if you have any aptitude at all, you'll be able to identify quite a number of trees and plants from what seems to be an amazing distance to the uninitiated.

This, in turn, will lead to the great turning point in your training. One day you will discover that you are subconsciously listening for unusual sounds; any change in the twittering of the birds, any movement seen out of the corner of the eye, will make you stop, look and listen. You find yourself noting everything you see, nearby or far away. You don't do it deliberately; it develops quite naturally. Welcome that day when it comes, for from then on everything will become progressively easier; you can say to yourself, "I am really becoming a bushman." But don't try to force it; like happiness, it won't come at your bidding.

Learn to know the stars if you want to travel at night. There are only three signposts in the sky; they are the Southern Cross, Magellan clouds and Orion. No matter what hour of the night it is or whether the Cross is the right way up or standing on its head, it can be used as a direction finder. The distance between the star at the head and the

one at the foo xtended in the same line three and a half times from the foot of the Cross indicates approximately the south celestial pole. Use the Magellan clouds—those two hazy patches of nebulae near the foot of the milky way—as the base of an equilateral triangle. Its apex is very near the celestial pole. To use the constellation Orion, part of which is sometimes called the "saucepan", look at the three bright stars in a row. Take the one farthest from the dagger, or saucepan handle, and draw an imaginary line from it through the hilt of the dagger and across the sky. This roughly indicates the south. If, after a bit of practice, you can catch just one glimpse of Orion or the Cross through a break in the clouds, you can fix the position of the south with reasonable certainty.

It is satisfying to know more than this about the stars; to be able to name Achernar, Sirius, Canopus and so on at a glance. But it doesn't seem to help the average person much when they're trying to fix the points of the compass at night. If you want to do more than just find south by the aid of the three signposts mentioned above, and have the necessary mental power for the job, learn to navigate. Dr Woolnough's *Direction Finding by Sun, Moon and Stars* is a good little handbook which has set out to simplify navigation, and Harold Gatty's *The Raft Book* is also good.

It may sound heretical to state that to some people a compass is merely something else to carry, but it is a fact. In the Army, especially, you were regarded as quite beyond redemption if you said that you had no need of one to find your way. You must have one, of course, if you have to take crossbearings to fix a position, and it is indispensable for many other jobs. Yet the fact remains that I can claim, without fear of contradiction, to have met some of the best practical bushmen in Australia. All were distinguished by two things; they were just like homing pigeons when it came to finding their way back to their camp, and they never

bothered their heads with maps or compasses. Take a man who doesn't get lost because he works with map and compass and let him lose both; usually he is like a rudderless ship, all adrift. That is when the man who does without both will come into his own. The best answer to this problem would appear to be this: learn map-reading and the use of the compass thoroughly, and also learn to do without both entirely.

Now for a final word on this subject. In the bush you may often be asked to put somebody on the right track, or to give directions for finding a certain spot. Don't draw a map on the ground, but on a bit of paper and give it to the person who wants the directions. Don't give him the landmarks of the correct route only, tell him also of the things that will show that he is on the *wrong* track. Don't end with the usual, and incorrect, information that he "can't miss it", because he can. So can you, if it's your turn to be directed. Don't trust to memory yourself, write down any instructions you are given. Above everything else, be suspicious of distances given; the proverbial "cocky farmer's mile" is most unreliable. And always ask for instructions which will tell *you* if you've taken the wrong turning, for this is one of the most important precautions to take if you wish to avoid getting lost.

CHAPTER IX

CAMPING

When selecting a camp-site remember that any fool can be uncomfortable. It's not being tough to bunk down anywhere, to get wet in your blankets or to shiver the night away—it's very stupid. Always, if possible, pick your camp-site before dark.

Many years ago I was with a party that had gone out duck shooting. The last few miles had to be covered on foot, the country being too rough and swampy for any other form of travel. It was midwinter and a bitterly cold sou'wester was blowing, with occasional squalls of rain. We came to a sandhill close to the swamps where we intended to shoot next morning and most of the party made up their bunks under the nearest bush. My father, however, stood on the crest of the ridge for some time, watching the bushes as they thrashed in the wind, then he made for a spot on the leeward side quite close to the crest.

"Notice what I was doing?" he remarked. "I was watching the wind on these bushes. Just here they hardly move, while everywhere else they toss with every gust. There's a little sheltered patch here, caused by the shape of the ground and the way the wind flows over it, I suppose. In windy weather you always want to look around for one of these spots, even on open, grassy plains. Nothing so chills you as to have the wind blowing on you all night when you camp out."

I don't think I was ever given sounder advice, but I found

there was one big drawback sometimes. You can find the sheltered spot quite easily by watching the way the wind moves over the ground, as revealed by the rippling of the grass or the tossing of the bushes, but when you walk up to it you find quite often that you weren't the first creature to discover it. In cattle country there may be a litter of cow-dung all around it; if sheep are grazing there, you might find sheep droppings thick on the ground, and in kangaroo country you occasionally find that the spot reeks of kangaroos. These animals also know how to find a warm spot to camp. The dung and the smell are bad, but worse still are the voracious ticks which may have gathered there.

Time used in building a windbreak when you cannot get natural shelter is well spent. In hot weather the coldest air is found in hollows; in frosty weather the warmest spot is just below the crest of a ridge. Never camp under big, gnarled, old gum-trees, especially on a hot, still night. Limbs are liable to come down without warning. It is a good plan to avoid all big timber, if possible, since dead sticks may come down at any hour of the day or night. When rain is threatening never camp in gullies, especially among bare hills. The rapidity with which a flood can come roaring down has to be seen to be believed.

Many people are afraid of lightning and it must be admitted that there is something awe-inspiring about a really bad electrical storm, especially those dry ones common in the outback. Everyone knows the usual rules about not camping under isolated trees, on hilltops, near wire fences or on ironstone outcrops, but I was long ago forced to conclude that there is no really safe place for a camp during a dry thunderstorm, except down a mine. In one way, there is no truth in the old saying about lightning not striking twice in the same place, because you can see the same ironstone outcrop hit repeatedly. On the other hand, it is quite correct, as an American negro soldier explained:

"No, suh," he said to me, "dere jest ain't no doubt about lightning not hitting de same place twice. If lightning hits place once, den de same place jest ain't dere no more!"

Anyone who has seen what lightning can do to a big tree will agree that there isn't enough of it left to be hit a second time.

Do not rely upon bush "barometers" such as ants, flies and spiders to forecast rain or storms; instead, get an elementary handbook on meteorology, study it and learn how to make a scientific reading of the weather signs. It takes but a few moments at intervals through the day to read the weather signs; dawn, noon, sunset and just before going to bed are the usual times, with additional readings should any change in the wind occur or a new cloud movement take place. It is not only a very useful study but a fascinating one as well, with quite a lot of skill in forecasting as the practical reward. It must be admitted that there is also a certain knack in it, but this comes readily to those with a scientific bent, and when once the fundamentals of meteorology have been grasped, about a year's practice will enable you to be as good a weather prophet as, say, a fisherman who has spent half a lifetime in learning by practical experience alone.

Let others argue about the virtues of watching how bees work, the cat washing behind its ears, ants raising their nest mounds, spiders making new webs and similar superstitions; it will pay you best to rely on what science can teach you. Anyone who has kept bees for a living will tell you that a sudden shower in warm weather will catch thousands of workers away from the hives; squally weather with bursts of sunshine alternating with cold gusts of rain in spring will decimate the workers of an apiary by catching them away from the hives. If ants, spiders and other members of the insect kingdom know so much about the weather, why do sudden floods drown countless millions of them? I've

seen sticks black with insects projecting from floodwaters, but they didn't crawl up there to seek refuge before the water came down, they were washed against the sticks and managed to crawl up to safety. Standing on a sandhill, I've watched snakes, lizards, bush rats and other animals go past on the swirling floodwaters; even a dingo bitch was drowned and washed up near my camp, and nobody can say that our wild dog lacks intelligence. I had previously shifted my camp to that sandhill because I could see that heavy monsoonal rain was likely, but no other creatures had come out of the low-lying country to join me, as they are supposed to do. The idea that animals, birds and insects are good weather prophets is just another old superstition which refuses to stand up to investigation.

Now a few words on the subject of snakes. Don't be one of those people whose time in the bush is spent in wondering if every noise they hear is caused by a snake. Don't believe that snakes won't cross a rope, a ring of ashes or any similar nonsense. The time to worry about snakes is when you are camping in one spot for several days, because they *do* get into the blankets sometimes. You'll find people whose whole life is haunted by a constant fear of snakes and others who never worry; the latter don't get bitten any more frequently than the former and they lead far happier lives. There are only three snakes in Australia which are really to be feared: the death adder, because it is so well camouflaged and does not strike until the tail-tip is touched; the tiger snake, because it may attack instead of trying to escape; and the rare but savage taipan of north Queensland.

If anyone does get bitten remember that every second counts. Don't bother with the usual bit of cord, bootlace, etc. for a twitch above the bite; carry a bit of rubber cord. It can be applied in a second and effectively checks the circulation. Remember also that a doctor must know what species

of snake caused the bite, or he won't know what serum to use. Whisky and other spirits are worse than useless for snake-bite victims.

Some people seem to pick up fleas wherever they go in the bush and suffer constant irritation from the bites and the crawling of the pests. If you can get some ordinary garden mint, which grows wild beside many of our creeks, and use it as the upper layer of your bedding, the smell will make the fleas leave you. If you rub your bare skin from head to foot with a mixture of equal parts of olive oil and eucalyptus, that will also keep them away for twenty-four hours. Best of all is to dust your underclothing, blanket or the inside of your sleeping bag with any good insect powder containing DDT.

In cold weather down sleeping bags are the only bedding to carry, especially when travelling on foot. They can be had in weights of from 3 to 4½ or even 5 pounds; in the last-named you will be able to sleep out in snow in comfort. A blanket gives more warmth when made into a sleeping bag. Rather than carry two blankets it is better to get an extra all-wool singlet and a pair of long underpants and put them on over the rest of the underclothing. For all advice about camping and lightweight camping gear you cannot do better than contact the New South Wales Federation of Bushwalking Clubs, or consult Paddy Pallin, of 327 George Street, Sydney, whose booklet *Bushwalking & Camping* is invaluable.

It is always well worth while to spend some time cutting or gathering enough grass, leaves, etc. to make a soft bed and insulate against cold and damp. Best of all stuff to sleep on is the Coorong mattress bush, a low, springy, grey-blue plant found in the sandhills of the Coorong in South Australia and on the dunes or cliffs all around the coast of southern Australia. Pick small branches and arrange them

neatly in a thick mat. Next comes bracken, pulled from the stems by drawing the hand up each frond. Don't cut it; cut ends in the bedding poke holes in groundsheets. She-oak needles are fairly good, and so is any fine, long grass, provided it isn't full of seeds like those of the speargrass. Pine-needles, some types of seaweed, tips of native cherry boughs, grass-tree or yacca leaves, thatching grass and similar stuff will make fair bedding. However, there is one bedding which is to be avoided if you can find anything else. I think it was the late Donald McDonald who said that "the real bush feathers are gum-leaves". I have never been able to make out why anyone should put forward such an idea, for of all the cold, hard, slippery and generally unsuitable stuff for bedding, our gum-leaves are about the worst.

Personally, I favour the A-tent for camping; mine is long, high and wide enough to enable me to lie at full length, to sit upright inside the entrance and it holds all my gear as well. Two cheesecloth curtains in the front keep out mosquitoes, sandflies and ticks; the sharp pitch sheds the heaviest rain, it shuts off cold winds and insulates against the frosts. Some people, however, favour other types; the Bushwalking Federation or Paddy Pallin can give sound advice on this matter. Made of japara cloth, these ultra-lightweight tents weigh as little as 2 pounds and are a great boon.

For the tropics you cannot improve on the jungle hammock, which was used by our troops. It enables you to get up in the air away from the damp, the leeches, scrub mites and other abominations. The net sides permit a good circulation of air but keep out the mosquitoes and other flying pests; the roof sheds the rain. Your gear is hung on webbing loops under the hammock and a zip-fastener opens or closes the sides.

Bushwalkers have whittled down the weight of the gear which it is necessary to carry. I have set out for a weekend

in midwinter, and the total weight of tent, groundsheet, rain-coat and sleeping bag carried was 8 pounds, yet I slept out in the frost quite as warmly and as comfortably as I would have done at home. Additional information on this point appears in a later chapter under the heading of "What to Carry".

CHAPTER X

"IT'S ALL IN THE COOKING"

THE bushman must learn how to prepare food properly; he must not remain content with only frying and boiling. No truer words were ever spoken than "It's all in the cooking". I don't know if there is any truth in the story of the famous French chef who cooked a fox for a wager and had all the diners, who had no idea what they had been eating, praise the ragout, but I do know that it is possible to cook other things so that people are amazed to learn that they have not eaten baby beef, but kangaroo, or that what they took to be young and tender chicken was really fruit bat (flying fox). I also know that a hotel-keeper used to be very famous for his dinners of roast wild duck, and that sometimes he would be able to procure no more than two or three ducks, with a dozen people expected to dinner. Yet everyone would have all the duck they cared to eat. No, it wasn't a loaves and fishes miracle, it was simply this: wild duck might be scarce but white cockatoos were very plentiful at some times of the year and were easily caught by sprinkling wheat on their feeding grounds with rabbit traps set at intervals. These cockatoos were plucked, drawn and stored in the butcher's refrigerator till required. They would be steamed gently for a couple of hours, then stuffed and put into the pan to roast with the genuine ducks. The flavour of the duck was imparted to the cockatoos during the cooking, the meat is of the same colour and texture, and only an expert could tell the differ-

ence when the birds had been carved and served. I'm quite sure about this, as I used to supply the cockatoos at a shilling each. . . .

Some big hotels play the same trick by putting a few young rabbits into the pans in which turkeys are roasting. It's marvellous how turkey meat will spin out when each serving includes a slice or two of rabbit.

The first lesson to be learned about cooking is this: it is seldom necessary to eat tough meat. I once saw a shearer take a galah which he had cooked, try to cut it and end by bouncing it on the table like a rubber ball before throwing it to the dog. He had popped it straight into the oven after plucking and drawing it, on the same day that he had shot it.

All these so-called tough birds, parrots, cockatoos, etc., need special treatment. Always, if possible, hang them for twenty-four hours. Then take a saucepan or big billy, put a few bits of quartz or similar stone in the bottom, or a bit of wire-netting, and stand the bird on it. Pour in a little water, but not enough to reach the bird, bring the water to the boil, then move to the side of the fire where it will just simmer and no more. The lid must fit tightly. Let the bird steam for one, two or even three hours, depending on its size and reputation for toughness, then roast in the usual way with fat and use the water to make the gravy.

Always cut kangaroo meat down the grain and not across it. Slice thinly. Lay each piece on a hard, smooth stone or a log and beat with the back of a heavy knife until the meat is reduced to shreds. Rub the bottom of a pan with a little fat and keep the meat moving on it until it is nicely browned on both sides, then fry in deep fat or put into a stew. Always, if possible, fry a little onion with kangaroo and put browned onions with it if used in a stew. If you can't do this, carry some dried onion powder and use for flavouring; dried and powdered sage will serve the same purpose.

Another way of dealing with tough meat, or any game whose flavour you dislike, is to cut it with a very keen knife until it is as fine as mince, then mix with breadcrumbs or finely-cut potatoes and herbs. Fry as rissoles.

The old bush standby of stew can be made or marred very simply. To ruin it, let it boil violently. To cook it properly, let it simmer so gently that you can hear only a faint bubble at intervals.

Aboriginal cooking. Remove the gut from small animals through as tiny an opening as possible, leaving the skin and fur on. Cut bigger animals into joints but leave the skin on. Dig a trench, whose size depends upon the amount to be cooked, fill it with light, dry timber, set fire to it and keep throwing in light sticks as it burns down until you have a good depth of ash. Scrape out some of the ash, lay the meat in the hollow thus formed, cover with ashes, make another fire of light brush on top and let it burn down. No hard and fast rules can be laid down as to the time anything takes to cook in this way, because so much depends upon the size of the joints and the quality of the fuel. When the animal is cooked, the skin and fur peel off cleanly, taking all adhering ash with them. The great secret is to have really hot ashes and plenty of them, without hot coals.

To cook small fish, drop them into hot ashes, unscaled and ungutted. When the fish is cooked the skin and scales peel off cleanly and the guts remain unbroken inside the membranous sac. Gut big fish and bake in ash like a joint of meat, with the opening closed by little skewers. You will often read that if you bake birds and small animals with the entrails in "the entrails form into a ball", etc. The aboriginal certainly likes his tucker cooked that way and eats most of the entrails too. The English epicure insists upon having snipe, woodcock and quail cooked with the entrails in, and he also eats them. (Read Mrs Beeton if you don't believe me!) But in practice with open-air cooking it just doesn't seem to work out right,

except with small fish; those who try it usually find that it results in the ruination of what would otherwise have been a good dish. If you think that those books can't be wrong when they tell you to leave the guts in and you want to try it for yourself in order to be convinced, bake an ungutted rabbit. It will work a permanent cure.

Game-birds, such as the wild duck, should be gutted, leaving the feathers on. Make some stuffing, even if it is nothing better than breadcrumbs and diced potato and onion, with dried herbs for seasoning, and fill them with it. Bake in the ashes. In this case also the skin peels off without trouble. Another method is to coat them with clay mixed into a very stiff dough, patting each into the shape of a football. When cooked, lift out very carefully, place on a sheet of bark and tap with a stick. The clay will fall off taking feathers and skin with it.

Kangaroo tail does not taste best when made into soup. Coil it up, lash with wire or strips of green bark and bake in ashes, and thus have one of the finest dishes on earth.

Most people know how to grill meat over an open fire, but the quickest and best way is to turn it into what an old Afghan whom I knew called "k'bobs" (khaibabs). Cut into thin slices about two inches in diameter, thread the slices, spaced about an inch apart, on a long wire or thin green stick, hold over a bed of coals and turn slowly until cooked.

Roasting on a spit. Drive a stake about five feet long into the ground beside the fire. By means of a *double* cord or strong string, also double, hang the joint of meat from the top of the leaning stake so that it is in front of, but not over, the fire. Put a dish or big plate under it to catch the fat. Give the cord a turn to start it spinning; baste with fat at intervals. If you cut a bit of flat wood or stiff dry bark to the shape of a table tennis bat and lash the handle firmly to the cord half-way, the wind or the draught caused by the heat of the fire will cause it to turn, keeping the joint spinning. Why

use a double cord? Well, if you use a single one the twisting often makes it unravel, and the meat falls. Use a long wire hook between the meat and the string so that the cord is not charred.

Tahitian cooking. In firm ground dig a pit about two feet across by a foot deep. Line it with flat stones and put a layer of them over the bottom. Be sure to use rock which won't burst into fragments when heated. If you have to dig the pit in sand, build the stone lining very carefully, to keep the sand from trickling in. In the pit light a fire of wood which makes good coals. Let the coals burn down, then shovel them out. Put down a layer of green banana leaf, then the pieces of pork, fish, taro, plantains, green papaw, breadfruit, or what-have-you, each wrapped like a parcel in green banana leaf. Add another layer of banana leaf and then heap the coals back on the top. Give this type of oven time to do the cooking properly. It is said that you get tired of this sort of food and of Tahitian cooking. Perhaps you would, but I wish with all my heart that I had been able to live long enough among the lovable Polynesians to get tired of it.

In this type of oven you can also cook snake, goanna tail, emu leg which has been well hung *and* has had the fat removed, turtle steak, kangaroo steak, green bananas, yams, water-chestnut bulbs, seeds of Polynesian chestnut, edible palm heart and prawns.

Always boil lobsters, crabs, crayfish and scale-fish in sea-water. Cook shellfish by laying them on the coals until the shells open and they begin to steam.

To cook the giant fruit bat (flying fox) hold it by the wing tips and dip into a bucket of boiling water for a few moments. Then peel off the skin, gut, and cook like chicken Maryland. Do not handle the body before dipping, as the repulsive body smell clings to the fingers in a most persistent way.

Another smelly but quite edible creature is the small fresh-

water tortoise. Kill it by cutting off the head; bake in the ashes upside down. Then split the shells apart. The guts will be found in a separate compartment; meat is at the base of the legs. The flavour is excellent, but the meat is a bit tough.

Baking bread. The simplest method of bread making is the twist. Cut a green stick about the size of a broom handle, remove twelve inches of bark from one end and place this end over the fire to heat the wood. Add some salt to self-raising wholemeal flour, mix well, add a *little* water and knead into a very stiff dough. Wind this in a spiral around the hot stick, the turns spaced about a quarter of an inch apart, and turn slowly over a bed of hot coals until nicely baked right through. If the innermost layer should still be doughy when you slip it off the stick, it shows that the wood of the stick wasn't hot enough when you wound the strip of dough on it.

Damper. This is the most important item in all bush cookery. Carry with you a bit of light duck or rubberized cloth, a piece of old Army groundsheet is good, about eighteen inches square. On to the centre of this tip a heap of wholemeal self-raising flour and into it mix about a quarter of a teaspoon of salt. Now make a hole in the centre of the heap of flour, pour in a little water and start to mix the dough with a clean stick, fork or a finger. Keep adding water, a teaspoon or so at a time, and stirring until about two-thirds of the flour has been made into a very stiff dough. Now cease adding water and work the rest of the flour into the ball of dough, using both hands and kneading thoroughly. At the finish you should have a large ball of almost dry dough which can be flattened into a disk about nine inches across and a bit less than an inch thick. The fire for baking should be prepared about an hour in advance. On smooth hard ground clear a level patch about a foot across. On this light a big fire of dry, light timber and keep adding fresh fuel

as it burns down. When you have a big mound of ash, mix the dough as described. Now sweep back the ash into a ring, leaving a light coating of ash over the bit of ground which you smoothed, and on this place your flat disk of dough. Shovel the hot ash back until the dough is covered by a layer more than an inch thick. Leave for about twenty minutes, then try with a thin splinter of wood. When the splinter comes out clean the damper is done. Fan the ash away, slide a slab of bark under the damper and place it *on its edge* out of the wind to cool. Do not cut till cool. It should be like light cake or good scone in texture with a very fine flavour.

You will meet lots of people who assure you that the real damper is made without either baking powder or self-raising flour. You'll read about it, too. Some claim that you mix ash with the water to act as rising, others that you let the dough ferment before use. All I can say is that, like the Man from Missouri, I want to be shown, and until I am shown I won't believe it and shall stick to baking powder or self-raising flour. It is thirty years since I first asked somebody to show me how to make a damper with plain flour and water only. I'm still waiting for a demonstration.

You have no need to go bush before you try your hand at these forms of cooking; if you live in a city you can do it in the garden. The wife of a retired missionary who gave a lot of help with the training of troops used to do it in her garden, with the class seated on garden chairs. We brought the firewood and the stuff to be cooked; she did the rest.

CHAPTER XI

FOOD IN UNLIKELY PLACES

IN the Army bushcraft classes it was our policy never to argue with anyone who disagreed with us. Instead of arguing we would demonstrate. On one occasion a member of the R.A.A.F., who had made a forced landing in bad country in New Guinea, and who had been through a tough time before he was rescued, grew quite heated.

"These stunts are all right in theory," he said, "but where I was there's no food except sago and prawns. How can you get through the trunk of a sago-palm with nothing but a sheath-knife, or catch prawns without a net?"

Such a statement couldn't be allowed to go unchallenged, so after a bit of trouble we were able to arrange a trip to country similar to that in which he had been stranded. It was the old story. Food was there, but in what an untrained man would regard as very unlikely places. The area was an alternation of strips of jungle and swamps. In the swamps were water-lilies with their edible seed-heads, shrimps hiding in bunches of water-grass, witchetty grubs in the trunks of dead sago-palms, wild duck nests in patches of reeds and on the rises a small wild yam. The airman was soon convinced. Another man, this time a member of the R.A.N., made the same statement about mangrove country, and he was also convinced by a demonstration. This chapter will be devoted to describing how a trained man can find food where the outlook would appear hopeless to an untrained one.

It would be difficult to find a more unpleasant area than among the mangroves fringing our coasts. Clouds of mosquitoes and those less dangerous, but far more irritating pests, the sandflies. descend upon you and give you no peace. Sweat pours from you in the sodden heat. You can move about only by climbing from one twisted root to the next; beneath you is gluey mud in which you sink to the knees. It is useless to search for drinking water there; neither mangrove roots nor trunks will yield water and one species contains a poisonous juice. Fresh water can be secured only if it rains or you can find a patch of higher ground where tea-tree saplings are growing. We usually found that these tea-tree saplings would yield drinkable water, even if growing on ground but a foot or two above sea level.

Yet mangrove swamps are a fairly good place in which to hunt for food. If you have a spear with you or can improvise one, fish can be speared in clear-water channels at low tide. On the mud, when the tide is out, you will find groove-like tracks; if these are followed they lead to large, cone-shaped shellfish. When roasted their meat is quite edible although of an unattractive green colour. By groping in the mud of channels at low tide, very large cockles can be found. They are not nice to eat but are sustaining. Here and there you will find burrows from which, after a lot of exasperating failures, a giant green crab can be hauled with a strong hooked stick. That crab is really a delicacy, but it can use its huge claws very swiftly. Judging by the way they crush a stick, they could nip off a finger with ease. These crabs can be caught in numbers by tying the white meat (adductor muscle) of a giant clam, or any other tough bait, to mangrove roots at low tide, using lawyer cane or jungle vine for lashing. Return after the tide has flowed and has ebbed again, poke in the mud below the bait with a stick, and any crabs which have hidden there will at once stick up their claws. The old bushman who showed me this trick wouldn't bother about

crab bodies. As soon as his probing stick touched a crab he would make a swift snatch with both hands, break the claws off with a backward wrench and drop them into his bag.

"There," he remarked, "a couple of dozen nippers make a feed for a man and the crab runs off and grows a new set. Ain't that an economical way to work a crab claim, eh?"

On many mangrove roots at low tide, especially along the creeks, you will find clusters of small but very palatable oysters. The most surprising source of food supply in the mangroves is found in dead and half-rotten logs. Split them open and you will find them riddled by the so-called teredo "worm", which is really a shellfish and no more a worm than an eel is. The long, jelly-like bodies are watery and have a flavour faintly like an oyster. In some mangrove areas birds like the cormorant make their nests, which are difficult to reach and contain eggs only in the breeding season. The eggs are very rank and fishy but can be eaten.

In the freshwater swamps, find a place where the water-grass grows thickly, bunch each tussock together with the hands, tear it up and throw it ashore. If the tussocks are then pulled apart small shrimps will be found hidden in them. They make a meal if you can get enough of them but it is better to use them as bait to catch something bigger in the way of a fish.

Prawns can be caught at night with a flare and a net woven of split cane, like a tennis racket with slack strings. They can also be caught by putting a lot of very bushy boughs into the water overnight and dragging them out next morning. Most of the prawns escape but you can usually bag a few of them. If you carry a small fish-net of very fine mesh with you, shaped like a cone, and stake it across a channel leading from one pool to another, with the opening facing into the current, it will catch quite a lot of prawns and some scale-fish as well. It has to be set overnight. Such a net rolls up into a tiny bundle and weighs but a few ounces; the

pygmies* of Dutch New Guinea make them of split cane. They work better if they narrow to a small opening and then widen into a bag with a drawstring, like the purse of a trawl.

To capture the freshwater tortoise use a hook and line or adopt the trick which you will often see children using round the ornamental waters in parks. Stand on the bank and clap your hands smartly; any tortoise near by usually pokes its head above the surface. Don't try to grab them as they swim away; instead, slip your hand under them and throw them ashore.

In many permanent waterholes in Australia a big freshwater mussel can be found by groping in the mud. It is almost revolting in flavour, only a lot of curry powder can disguise the taste, but it is sustaining. In the north a much smaller mussel with excellent flavour can be found by scratching in the sand at the edge of pools along the rivers. In the Kimberley and adjoining districts a small freshwater crab can be found on the edges of billabongs: search for small burrows with pellets of mud outside them.

Warning: Cook all freshwater shellfish, shrimps, prawns, crabs and crayfish very thoroughly, especially in the tropics. They harbour liver-fluke.

A hornet's nest is about the last source of food you would think of, but aborigines regard one as a delicacy. The big comb hangs from a limb, often quite close to the ground, covered with very large and alert yellow hornets with vicious tempers and amazing stinging powers. Reconnoitre the nest from a safe distance, then get a long stick and tie a bunch of dead grass or dry pandanus leaf to it. Set this alight and then advance on the nest up the wind, so that the smoke will protect you if the hornets attack. The first lick of the flames singes all the wings off the hornets and they drop to the ground. Knock the comb down, toast it on both sides like a

* These people are not true pygmies; they are negritos of short stature. True pygmies are found in Africa.

slab of bread, then pick out the roasted grubs and eat them. The flavour is something like that of witchetties but not as good.

Finding food in semi-desert country. Set light to clumps of spinifex where there is no danger of starting a bushfire, letting them burn against the wind. Stand by with a stick to kill anything which runs out. You may burn a hundred tussocks and see nothing but a few beetles; on the other hand, you may get a marsupial rat, lizard or snake from the first one. It is all a matter of luck.

When a fire has cleared a patch of ground, go over it carefully for the burrows of kangaroo rats, rabbits, and anything else which lives in them. If you want to waste time and energy, try to dig something out by shovelling blindly. If you want to get something to eat copy the aboriginal woman's method. She never tackles this sort of job without a long, pliant stick as well as her digging stick. When a burrow is found she inserts one end of the long stick with great care, twirling it with her fingers to make it go round the bends. When it has been pushed in as far as it will go she starts digging, following the guide-stick. In this way she never loses track of the burrow. Before starting to dig out rabbits aborigines always hunt for and block the escape burrows; nothing is so exasperating, after you have been digging for an hour or so, as the sight of rabbits popping out of an unblocked entrance and racing away. Whenever aborigines come to a fork in a burrow, they always block up and mark one branch before digging farther, leaving the blocked one to be dealt with later. The stick is pushed ahead of them all the time. When they feel the guide-stick touch a rabbit they take another stick with a fuzzed end, poke it down, twist it until it has a good grip of the skin and fur and then haul it out. You can get rabbits out of burrows or hollow logs in the same way by using a bit of fencing wire with a wet tip.

When you are hunting for food on rocky hillsides carry two sticks, a long one to use as a lever for rolling rocks aside and a short one for a club. Usually your catch is confined to snakes and lizards, and it is a good plan to do this sort of hunting early in the morning when everything is cold and the reptiles are sluggish. Later on in the day, when the air has warmed up, they can move like greased lightning. Under stones on hillsides, if all else fails, you can usually get enough ant eggs for a meal. You need a tiny brush for the job, made from your own hair if need be, and a little bit of bark. Sweep them up as if using a midget dustpan and broom, brush any dirt away and eat raw. Flavour is floury, sweet and nutty.

This little pan and brush can be used to gather edible seeds. It would be an almost hopeless task to gather a quantity of these tiny seeds directly from the plants, but fortunately you have an ally in the harvest ant. These busy little insects gather seed over a big area of ground, carry it to their nest and place it in a ring around the entrance. Go from one nest to the next, sweeping up the tiny grains; when you have gathered sufficient seed, winnow it very carefully to remove husks and any light foreign matter, then wash in a pan with a swirling motion, similar to that used in gold washing, to separate sand from seed. Now grind the wet seed to a paste between two hard, flat stones, pat into little flat cakes and bake on a hot stone. It is most important to do the grinding very thoroughly, or a lot of the seed will not be digested.

In some inland areas the wind collects seed for you. On areas of grassland the way in which the dead stems are lying shows the direction of the prevailing wind. Go to the leeward side of the grass patch and you will find the seed lying in wheel ruts, hollows, against stones or tree roots. Sweep up and treat as you did with the seed which the ants had collected.

Frogs' legs are delicious; in America and France they are

regarded as a great delicacy. To catch frogs at night dazzle them with a strong light as they squat on logs, stones or lily leaves, then move your hand up *behind* them and grab. To catch them in the daytime find a patch of dense reeds or rushes in a swampy spot beside water and light a fire so that the smoke will blow through the reeds. Thinking that the reeds are on fire, the frogs jump out and make for the water. Grab them as they go past. You can also find them under stones, logs or slabs of fallen bark around the swamps.

In the tropics, from November to March, turtles come ashore on sandy beaches to lay their eggs. There are three species of turtle: the huge and sometimes savage loggerhead, the hawksbill and the green turtle, the last-named being the edible one. You can easily distinguish all three: the loggerhead by its size; the hawksbill by its parrot-like beak, with the upper jaw hooked over the lower, and its overlapping shell plates; the green turtle has a lizard-like head and its body plates meet at the edges without overlapping. It can be harpooned in the shallows or turned on its back when it comes ashore at night to lay. Turtles make tracks like those of a tractor. To locate a nest follow these tracks and wherever the sand seems to have been disturbed and then flattened again, probe with a stick. If the end comes up with yolk on it, you've found the eggs. They are quite good to eat but the whites will never set, no matter how long they are boiled. If you are finicky, scramble them. The meat of the green turtle is fit for a banquet; nothing on earth can compare with it. Kill the turtle by cutting off the head after you have turned it on its back, split the two halves of the shell apart and cut steaks from the meat around the base of the legs.

The edible seaweed is found along big stretches of our coast. In appearance it is thick, translucent and of a yellow-brown colour. It is gathered, hung in bunches to dry and stored until required. To use it, soak in fresh water until

it swells to its original size, then simmer gently until dissolved, strain and allow to cool. It will set into jelly. It can be flavoured with fruit juice and sweetened to use as a dessert, or poured over cooked meat to make brawn. This jelly is the agar-agar of commerce.



EDIBLE SEAWEED

When travelling across any sort of country except true desert, where you find nothing because there is nothing to find, the worst thing to do is to travel until you feel hungry and then start looking for something to eat. Incidentally,

that is what a white man usually does. As a result, many more hours may elapse before he does find food. It is best to copy an aborigine on a walkabout; his technique is entirely different. He wants to reach a certain spot and he will get there eventually, but seldom does he make a beeline towards it. Instead he makes the route and the time taken on the journey secondary considerations; he concentrates on finding food, no matter how many detours it involves. He also does not scorn the smallest morsels. In one place you will see him turn aside to gather the seed-heads from a grass patch; he removes the husks by rubbing them between his hands, winnows them by blowing and then eats them. At another spot he turns aside to get a witchetty or two from some wattles. Half a mile farther on he goes over to a small bushy tree and picks up a few sandalwood nuts.

If he copies these methods by being on the lookout for something edible all the time, and by not waiting until he feels hungry before seeking food, the good bushman will feed himself where the untrained man starves.

If you have an aboriginal companion in the bush never let him go off on his own to find something for the pot. Go with him, study his methods and then try your hand at it. Many so-called bushmen prove to be very helpless without an aborigine to do the hunting for them. In *Madman's Island*, which is one of the best descriptions of "living all same blackfeller" ever written, Ion Idriess admits quite candidly that, although he had often been out hunting with parties of natives, he had never tried his own hand at fish spearing until he had to learn the hard way while marooned on the island.

This habit of always keeping an eye open for something to eat in the bush is soon acquired; thereafter it becomes second nature and you do it without thinking. When you are training others, however, show them what to do, make sure that they

have mastered the lesson, then refuse to share your catch with them if they have failed to find or catch anything, unless, of course, they have no food of any kind. I know this sounds mean and selfish, but if you don't do it, you soon find yourself saddled with the job of hunting up tucker for most of the party. It is indeed a case of being cruel to be kind to make your pupils do their own food hunting.

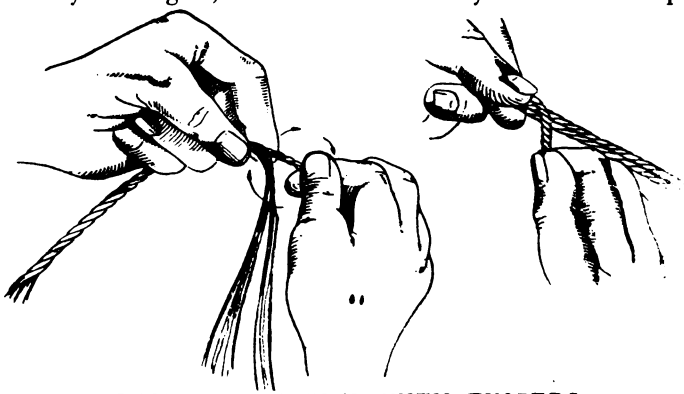
CHAPTER XII

LINES, CORDAGE AND THATCHING

BOOKS of this type usually devote a considerable amount of space to the making of cordage and twine and the building of bush shelters. There is a good reason for it; those who live in the bush know how indispensable both rope and string are, while the ability to build a weather-tight shelter is of such obvious importance as to need no stressing. Unless you can find fibres and spin them into any size of string or rope you need, or can build yourself a shack from any materials at hand, you aren't a real bushman.

Every district and country has its fibre plants; it might be the Tolmer grass of the Coorong in South Australia or the inner bark of the pohon pooti tree (hibiscus) of the Indies; the banjine of Western Australia or the coconut fibre of Polynesia. If you don't know what the fibre plant of your district is and nobody can point it out to you, it is your job to find it. (Usually it is a hibiscus.) Go from one species of plant to another, cut through the bark close to the ground, run your knife under the bark in an upward direction until you can grip the piece with your fingers, then pull upward. If a long strip of bark comes off, tear the inner layer off and try it for strength. If it is so tough that it threatens to cut into your fingers without breaking, you've found what you require. If no small trees or shrubs have such an inner bark, look for sedge-like plants with long leaves, growing on sand-hills or near swamps and try the strength of a strip of their leaves.

When you have found a bark or a leaf containing strong fibres, scrape it with a blunt knife to remove all soft plant material and allow it partly to dry. Then make up three strands of the material, hold their ends between the finger and thumb of the left hand, take the top strand between the finger and thumb of the right hand and twist it *away from you* by moving the right forefinger from the tip of the thumb to its base. Now bring this twisted strand towards you and pinch it between the finger and thumb of the left hand. This brings the next strand to the top; twist and lay it in the same way, then the third one. The first one is now on top again; twist and lay it once more. The movement soon becomes as automatic as that of a woman when knitting, and under your fingers, at the rate of twenty feet or more per



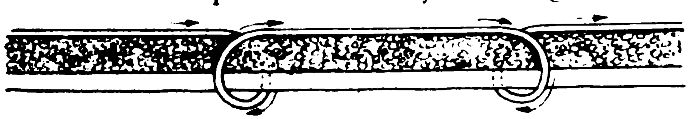
LAYING UP TWINE WITH FINGERS

hour, the string is laid up. As you near the end of a strand, include some more fibres and be sure to keep the strands of equal thickness. You can make anything from a fine fishing line to a rope half an inch in diameter in this way. If you cannot follow these instructions with the aid of the diagrams, hunt up a seaman among your friends, produce some binder twine, and ask him to show you how to lay up yarn.

In practised hands this hand-laid line can be almost as smooth in finish as stuff from a factory. In Army bushcraft schools one test consisted of gathering fibre, laying up a line, improvising a hook from a splinter of bamboo or hard-wood and catching a fish with it. In the tropics lawyer cane or thin jungle vine is the great substitute for rope.

It is well worth while to know how to lay a waterproof thatch, especially in the tropics. It isn't so bad to be without cover in the south for a day or two, even in midwinter, but you must have shelter during the wet season in the north. We will deal with grass thatching first, carried out with any long, straw-like material, be it grass or rushes, reeds or yacca leaves. It is simple to estimate the amount needed for your first attempt at thatching: you cut as much as you think you will need for the job and pile it in a heap. Cut some more and build a bigger heap alongside the first one. You will then find that you have from one quarter to one third of the quantity required! If the material is green let it wilt; if it is dry damp it slightly. Measure the average length of the grass stems, deduct four inches for overlap, halve the remainder, and that is the distance at which your battens have to be spaced. For example, if you were using rushes averaging nineteen inches in length, you would space the battens seven and a half inches apart. A thatched roof should never have less pitch than forty-five degrees.

When laying thatch of this type bunch the material into small sheaves and place them side-by-side along the bottom

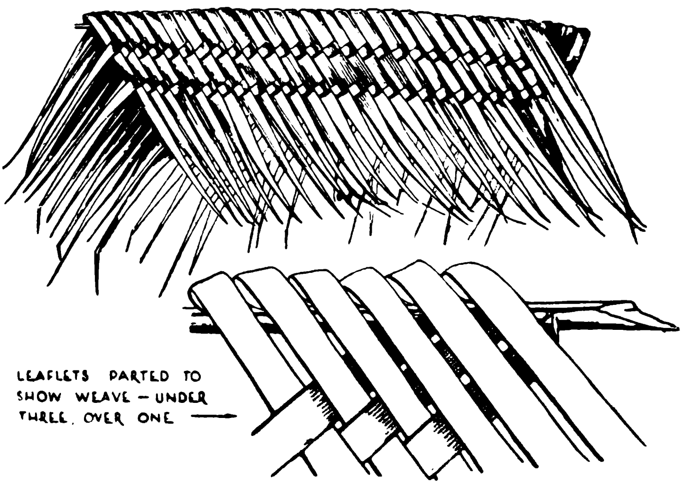


SHOWING DIRECTION OF SEWING THREAD IN THATCHING

battens. Using tarred string or very thin jungle vine, sew this layer to the lowest batten with an over and under stitch

(see sketch). Now sew the same layer to the next batten. Then lay another row of sheaves, with their ends overlapping that second row of stitching, and sew that lot to the third batten. The next row covers the third line of stitching and is itself sewn to the fourth batten, and so on up to the ridge. The ridge-capping is made of sheaves bent in the form of an inverted V and sewn to the top battens.

To make Polynesian thatch cut green coconut-palm leaves in half and reject the butt half. Now lay each half-leaf on the ground, take the leaflets growing on one side of the midrib, bend them across and pass each one under a leaflet on the opposite side. Work right down the leaf in this way, then go back to the start again, pick up each leaflet which was passed under the opposite one, take it over three more then under one again. An alternative to this is to take it

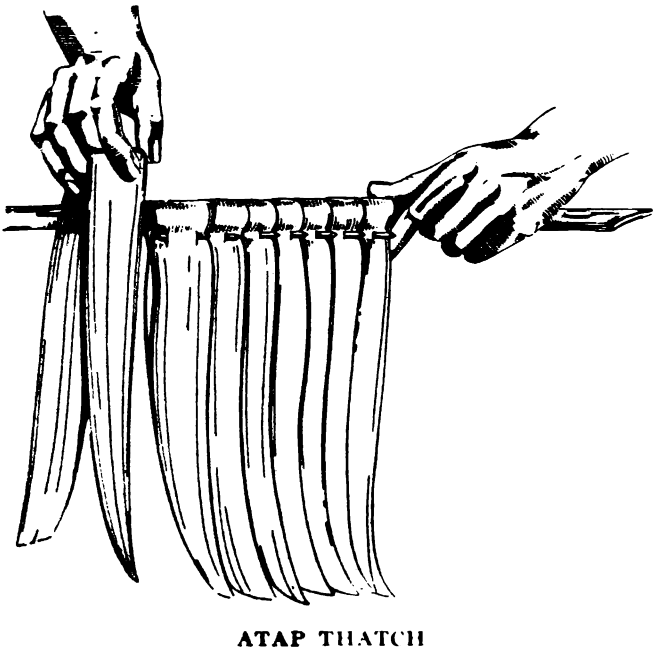


PALM-LEAF THATCH, SHOWING WEAVE OF LEAFLETS

over three after bending it over the midrib and then under one, over three more and under one again. This produces flat

sheets of woven leaf. These are laid all the way up the rafters a few inches apart, each one being tied into place with split cane. No battens are needed as the midribs act as battens.

To make Malay thatch (atap) use smooth straight sticks or sago-palm leaf midribs. Cut leaflets of pandanus or sago, bend them in the middle, drop them over the stick, giving each a good overlap on the one next to it. Then go right along and put a little bamboo skewer through both sides close up to the stick, or lace with very thin split cane. Lay



ATAP THATCH

in the same way as Polynesian thatch. If properly woven and laid, either type of thatch will keep out the heaviest rain,

and thatch which will keep out rain falling at the rate of four inches *an hour* is pretty good.

Bark slabs can be used for roofing. Mark out the size required on the trunks of the trees, outline with right and left axe cuts, then lever off with a stick with a chisel edge. Don't kill trees by removing the bark all round the trunk; take your slabs from one side of the tree only. If you do this bark will soon grow over the scar and the tree will go on living. To straighten these slabs place the inside surface close to a hot fire, then *slowly* flatten them by gentle pressure with the foot. Stack up to dry with a weight on top. Trees like the stringybark or jarrah make the best roofing in southern Australia; up north the best is the paperbark tea-tree. Rough and ready huts can be built in this way but you can also make them really beautiful. Some of the best Polynesian houses, with their braided sinnet lashings, neatly-cut timber jointings and evenly laid thatches, are works of art. Many of the New Guinea long-houses are nearly as good. Thatch is cool in summer and warm in winter; rain in the tropics doesn't fall on it with that maddening roar which it makes for hour after hour on galvanized iron. But it harbours all sorts of vermin and it has one dreadful drawback—Fire.

I am one of the last persons to decry galvanized iron, as far as roofing goes. You can't do without it where you have to catch and store rainwater. It is vermin-free. It doesn't take fire from a single spark, as I've seen thatch do. You must have it in the tropics if your "godown" (goedang) for storing copra or other produce is to be reasonably fire-proof and vermin-free. And yet. . . .

My last memory of my all too brief stay in Polynesia is the sight as we came out of the hillside jungle and found ourselves on a little plateau. Above our heads the tall coconut-palms thrashed their fronds in the steady rush of the trade winds. Great woolpack clouds were sailing across the dazzling arch of the sky. Beyond the edge of the plateau was a sea of

almost unbelievable blue, with the surf creaming on the reef. Among the palms were groves of shapely, spreading bread-fruit-trees, thickets of tall plantains, hedges dotted with the brilliant scarlet of hibiscus flowers and underfoot was a soft, natural lawn. Dotted about were beautiful native houses with their high thatched roofs and low eaves.

And right in the middle of the picture, hideously jarring to the eye, was a huge copra shed of corrugated iron. We had an artist in our party; his remarks about galvanized iron were unprintable. Being a reasonable man, he had to admit that it was necessary. "If only they could make the cursed stuff permanently coloured in soft, mottled shades of grey, brown and green," he said, "it'd harmonize anywhere."

I think that the manufacturer who could make corrugated iron for roofing with a coloured matt surface would also make a fortune.

CHAPTER XIII

KEEPING HEALTHY IN THE BUSH

THE Army made a fine job of caring for the health of the troops, and was especially successful in its campaign against malaria. Keeping fit in the bush anywhere is dependent upon a scrupulous observance of all the rules of hygiene, together with a balanced diet and an avoidance of risks. The man who takes risks in southern areas may get off lightly, but the man who does it in the tropics is a fool indeed. It is doubtful if the world was ever given a more awful example of neglect of health in the tropics than that provided by the Japanese, and they paid the full penalty for it.

In southern Australia the chief enemy is the fly. Only constant care will defeat this filthy pest. The best form of camp sanitation is that adopted by the cat—burying. You must never give the flies a chance to settle on anything; all used tins should be burned out in the fire before being tossed into the refuse pit and all table scraps burned. Never mind the complaints from campers with sensitive noses about the smell of eggshells, fish-heads, bones, etc., in the fire; smells can't hurt you but flies can. The camper who doesn't carry a mosquito-net bag to use as a meat safe is without one of the bushman's main items of gear.

In a camp established in one spot it pays to set aside one tent for meals and to make it flyproof. Across the front, with a good overlap in the middle, hang two curtains of mosquito-netting, weighted along the bottom with a strip of bagging

or old canvas, long enough to sweep the ground. Along the bottom edge of the rest of the tent, sew a strip of hessian and bury this in the earth. Use a fly-spray inside before a meal is served, should any flies get in. In this way you can have a meal in comfort without having to eat with one hand and wave flies off your food with the other.

If the camp has an open shed for meals fly-proofing is out of the question. Many hostels are also without fly-screens. In these places you can keep the flies down by mixing treacle with hot water and adding two tablespoons of Fowler's solution of arsenic to every teacup of the mixture. About half an hour before each meal is served, cut some green boughs and sprinkle them with the mixture; hang these above the tables. To draw the flies to them put a bit of partly-cooked meat in a little bag, sprinkle the outside of the bag with the mixture and hang in the centre of the bough. Just before the meal is served sweep up the dead flies and remove the boughs. You should also go all round the camp noting where flies congregate; these spots, which will be found to be mainly walls where the morning sun makes warm spots, should be sprayed with DDT. Don't worry about the fact that the syrup used on the boughs contains arsenic; the quantities used are so small that the poison won't kill anything bigger than a fly. If these precautions are carried out in a thorough way the flies seem to disappear within a day or two.

For bushwalkers, who carry all their gear on their backs and are on the move most of the time, we have not yet worked out a method for killing the flies which gather in a cloud whenever a halt is made for a meal. This only happens in some areas, of course; in others, there are very few flies. We have noticed, however, that you pick up the flies as you walk along; they spend their time buzzing about your head and face or settle on your back or your pack, to make a bigger nuisance of themselves at the halts. We have hopes that some form of DDT will be put on the market which can be

sprayed on the backs of shirts, rucksacks, hats etc. and will kill the flies.

"Criminally careless" is the only description that you can apply to those who fail to provide a proper latrine trench, with plenty of earth or ashes to throw in every time it is used. For some reason which cannot be fathomed women, usually more fastidious than men in everything else, are more neglectful in this. From one careless lot of campers the flies can spread dysentery in an area.

In the tropics your chief enemies are mosquitoes, ticks, scrub mites, leeches and sandflies. The tick is a tiny blood-sucker which moves about at night and can pass through the meshes of an ordinary mosquito-net, but not through one with a specially fine weave or the good quality cheese-cloth often used as a substitute. The best type of net to combat ticks as well as flying insects has a calico top, netting sides and ends, and a nine-inch strip of calico all round the bottom edge; it is a little more than six feet long, three feet wide and four deep. With the calico hem tucked well under, the bedding ticks are unlikely to reach a sleeper. The A-type hiker's tent can be made tick-proof by using the mosquito curtains already described, and by sewing a false bottom to the lower edge, inside and above the eyelets used for the pegs; after the tent has been pegged down, this four-inch strip is buried in the earth or the sand before the bedding and groundsheet are placed in position. If you do pick up a tick and it fastens to you, don't try to pull it off; if you do the head breaks off under the skin and makes a nasty sore. Instead, make it release its hold by touching it with a drop of kerosene or turpentine, carried for the purpose in a little bottle.

The scrub mite of the tropics is similar to the itch mite of the south, but whereas the latter only causes an acute irritation of the skin, which can be cured by rubbing the affected parts with a mixture of kerosene and medicinal paraffin or eucalyptus and olive oil, the former carries the

virus of scrn /phus. To avoid it, keep out of all patches of jungle kn n to be infested, never sit on a half-rotten log to rest in the jungle, and wear long trousers and gaiters, with mite repellent rubbed on the socks and trouser ends. Shorts are very comfortable and I wear them whenever I can, but they are definitely out in the tropics.

The tiny scrub leech can make its way through the lace-holes of boots or the weave of a sock; its bite causes nasty sores. It can get into the nostrils of sleeping people and has even been known to fasten on the eyeball. Never pull scrub leeches off; to make them let go hold the glowing tip of a cigarette near them or use a lighted match. In the daytime you can keep them off your legs by unpicking the hem of your trouser ends, turning the hem up on the outside with a stitch at intervals to hold it, then placing salt all round in the pocket thus formed. Over this put your gaiters. The prevailing dampness and your sweat dissolve this salt slowly, and if there is one thing a leech cannot stand it is salt. In bad leech patches you can amuse yourself by standing still on the track; in no time you'll see the horrible pests coming from all directions. They start to climb your boots; as soon as they touch the damp, salty area they fly off again and before long each foot is surrounded by a ring of writhing leeches—a very satisfactory sight to anyone who has had his ankles and legs a mass of sores through leech bites in the days before he learned the salt trick.

The sandfly can be a dreadful pest, penetrating all but the finest nets and making life a misery, but you can keep it at bay by rubbing all exposed skin with the mosquito repellent used by the Army.

Finally we come to the most deadly foe of mankind in the insect world, the mosquito. Contrary to what you might think the most irritating mosquitoes are not found in the tropics, but in places like Alaska and Lapland inside the Arctic Circle during the brief but hot summer. They can also be

very irritating along some backwaters of the Murray, on the north arm of the Port River a few miles from Adelaide, and almost anywhere in the suburbs of Brisbane, though here only civic apathy is to blame. Years ago an anti-mosquito squad cleared them all out, but the work was allowed to lapse.

For danger to human life and health, however, the mosquitoes of the tropics are the worst. Don't take malaria lightly. It may not be as painful an illness as very severe influenza but the after-effects are serious; it can recur for years. The Army proved definitely that one or two atebrin tablets per day together with certain precautions, will keep malaria at bay. Long trousers should be worn and shirt sleeves rolled down after sunset; mosquito repellent should be rubbed on all exposed skin; and sound nets should be used at night. Towards the end of the war Australia led the whole world in malaria control, thanks to the work of the scientists at Cairns and the men who acted as their human guinea-pigs. As the result of their investigations Australians were sent to advise the medical services of all the Allied armed forces on malaria treatment and control.

One of the men who was so engaged told me a story which he swore was true. Called in to advise on the subject of a puzzling sickness which was afflicting troops in India, they diagnosed it as an obscure form of malaria. An Indian Army medical officer fixed his eyeglass firmly in his eye, stared at the Australians, and then replied in scandalized tones, "Malaria? *Poonah!* NEVAH!"

It yielded to the latest malaria treatment, for all that.

There is no need to carry out the ridiculously extreme anti-malaria precautions which the Army enforced, but if you go into any malarial area take atebrin without fail every day and adopt all other precautions I've mentioned. Don't be worried because atebrin stains the skin yellow; it wears off

when you no longer need to take it, and even if it stained the skin bright blue, it wouldn't be as bad as malaria.

Don't listen to any tales about marvellous cures wrought by bush remedies. I met one man who swore that he had cured advanced tuberculosis by taking copious doses of horehound and rum; another man was equally sure that he had kept malaria at bay by using the "quinine" from the bark of the Leichhardt-tree. Sheer nonsense, of course; the bitter extract of Leichhardt-tree bark has no medicinal value. We found that there are only two bush remedies worth bothering about, but those two are very good. Growing wild through northern Australia and the Islands are two little shrubs, *Sida rhombifolia*, sometimes known as *Sida retusa*, and *Grewia polygama*. Both have thin stems and leaves something like the leaflets of the rosebush; *Grewia* carries berries of four segments which are fused together and red when ripe, and *Sida* carries small six-sided buds and yellow flowers. If the tender leaf-tips of either plant are chewed and the juice is swallowed, diarrhoea can be checked in an hour or two. Neither plant, however, can cure or even ease amoebic or bacillary dysentery, in spite of claims that it does.

Don't go barefooted in the tropics. You are little short of a lunatic if you do. That's the way to pick up hookworm, sandworms, chiggers (horrible little fleas which burrow into the skin) and other parasites, including that tropical ulcer which our unfortunate P.O.W's knew so well.

Several dangerous plants are found in the tropics.

Most people have read something of the stinging-tree of Queensland jungles; to those who go into any of the rain forest areas of that State a warning must be given. Make it your business to see a specimen of this plant at the first opportunity, study it closely, then avoid it like the plague in future. It is impossible to stress the danger of this plant to anyone unfortunate enough to brush against it; the ordinary stinging-nettle is balm of Gilead by contrast. The

first sensation is like a very powerful electric shock in its suddenness, followed by agony similar to that of a bad burn, which doesn't stop. It is often stated that the juice of a cunjevoi bulb will ease the agony, but this is yet another fallacy which is perpetuated by people who have never tried it out for themselves. The violent pain is caused by fine, flinty hairs penetrating the skin; they contain a hollow filled with concentrated formic acid. The best first-aid treatment is to shave the part; this pulls out some of the spines. Next, dab on ammonia, carbonate of soda or a paste of fresh wood ash and water, or any alkali which will neutralize the acid. Don't put plain water on the part; this only increases the pain. The danger of the "Gympie-gympie", or stinging-tree, to those who are unaware of its appearance cannot be over-stressed.

Another highly dangerous vegetable is found in the scrub of northern Queensland; it is the finger cherry. Somewhat like a small, elongated, reddish loquat in appearance, it grows on a small tree whose stems are flattened and whose leaves grow in opposed pairs; each segment of the stem has the flattening at right angles to that on the segments next to it. This fruit is very attractive in appearance, but eating it causes permanent blindness.

On the sea-coasts of Queensland, New Guinea and the Indies there grows a large tree with thick foliage; it is probably the best shade tree to be found there and thus is likely to attract campers. It can be recognized by a small, red, wrinkled tomato-like fruit with a woody nut below the fleshy part; by the fact that some insects eat away the fleshy portions of the leaves, leaving only the veins; and by the black, thick, tar-like sap which flows from any wound in the bark. This is the tar-tree whose sap causes bad ulcers if it comes in contact with the skin; moisture dropping from the leaves carries with it a dust which can cause serious damage to the eyes. It is, therefore, to be avoided at all times.

On parts of the coast these trees bear prominent placards, warning campers not to sit or sleep under them. Known as pohon nengas to the Malays, this tree is thought to be responsible for the upas-tree legend, which may have been originated by natives who told the tale to their children in order to frighten them away from it.

The final advice for keeping healthy in the tropics is this: remember that alcohol in any shape or form does not keep any tropical complaint at bay, nor does it make it easier to stand the climate. Do not make that tragic mistake, so often described as the chief error of the Englishman abroad, of taking all your cold climate habits of eating, drinking and dressing into the tropics with you. If you want to know what to do, get a copy of Cilento's *White Man in the Tropics* and follow the advice given in it. If you want an example to copy, take the north Queenslander for your guide. He lives in a climate very similar to Calcutta but, never having heard that it is fatal for a white man to do manual work in the tropics, he works hard and thrives on it to such an extent that his part of Australia has one of the lowest death rates and highest birth rates in the continent. Not realizing that you simply must dress for dinner every night or go native, he sits down to tea in a sleeveless singlet, shorts and slippers (inside a mosquito-proof house, of course) and feels all the better for it. Unaware that he "looks like a beachcomber" if he doesn't wear a collar and tie and put on a coat, he wears open-necked shirts and forgets that such things as coats were ever designed.

It does him a lot of good, too.

He eats food suited to the climate and thus avoids the greatest curse of the tropics—a lot of useless body fat. If he gets prickly heat he doesn't try—unsuccessfully—to cure it with salves and lotions, but he adopts the only cure which is a scrap of good: he exposes the affected parts to the sun and air, gets them tanned and the irritation vanishes. Nobody

can make him hurry; he works at a steady, leisurely pace suited to the climate. He doesn't pine for the day when he will be able to retire and "go home" to live. To him, born and reared there, that part of the world *is* home and he cannot understand why anybody would want to exchange it for frosts, fogs and freezing winds. In short, he is a very sensible fellow indeed, who has shown the world that white settlement is possible in some parts of the tropics and that we can be both happy and healthy there.

When the rest of Australia shows the same sound sense by discarding all stupid habits of food and clothing, we'll all be a lot better off.

One piece of advice holds good almost anywhere: you can walk about or work in wet clothes without coming to much harm, but it is dangerous to sit about or sleep in them. If you have no raincoat and the shower looks as if it will be a short one, pull off all your clothes, roll them into a tight bundle, cover with bark or place in the lee of a log or a rock, and take a shower-bath. When the rain eases off, rub yourself down with a handkerchief or a bunch of grass and dress again. Even if the shower is a very cold one, it won't cause as much harm as wet clothes may. During prolonged wet weather, try to have a dry change of clothing; if everything gets soaked build a brush lean-to with an open front and hang your clothes up in it, or hang them against the face of a steep rock, and light a good log fire in front of them. Let the heat radiating from the fire dry them; don't attempt the ruinous expedient of trying to dry them on sticks held *over* the fire.

It is a strange fact that many people out in the bush with nobody to see them, even if by themselves or in a party all of the same sex, prefer to get their clothing saturated rather than pull off their clothes and keep the bundle dry until the shower is over.

CHAPTER XIV

WHAT TO CARRY

THE only way in which you can really see the country is to traverse it on foot, as members of bushwalking clubs do. There is something about walking as an exercise which puts it above all other forms of physical activity. The walker has time to look about him and to think. To quote Horace Kephart: "All the wild parts of the earth are his by a title that carries with it no obligation but that he shall not desecrate, nor lay them waste." On some craggy mountain summit, with the wind in his face and an illimitable view of cliffs and ravines, valleys and distant plains at his feet, the walker feels as one with the eagle; walking on a carpet of fallen leaves through the towering tree columns of the forest, with the bird-calls echoing round him, he feels as free as did our hunting nomad ancestors. His home is where he chooses to camp; in the rucksack on his back he carries all he needs in the way of food, clothing and shelter. Once away from the city and out of sight and hearing of civilization all the cares of ordinary life seem to fall away. His legs carry him anywhere—to the peaks where he is rewarded by the grandest views which the eye can behold, or to the unspoiled glades of the bushland, deep in the mountain valleys. No matter how far he travels or where he goes, there are always new spots to visit or fresh trips to plan and carry out. All this is his—if he has two sound legs, an outfit on his back and a few shillings in his pocket.

The beginner is always faced with the problem of what to take with him and what to leave behind. From the outset he should realize that what Brigadier Fergusson said is true. Writing of his experience as one of Wingate's raiders behind the Japanese lines in Burma, he summed up the matter by saying: "Only a few things are really necessary—but how necessary those few things are!"

Nearly everything you need to know about your gear and equipment can be found in Paddy Pallin's little handbook *Bushwalking & Camping*. I shall not cover the same ground here, but will mention a few additional things drawn from my own experience and stress a few points.

Firstly, the modern steel-framed rucksack is the best thing to carry your gear. If you can't get one or you don't wish to incur the expense until you are sure that you'll like bush-walking, use the old-style swagman's outfit of blanket roll and tucker-bag rather than a second-hand Army pack. To anyone who has ever carried either rucksack or swag, the Army outfit was a constant source of irritation; so much about it was poor in design and there was so much useless dead-weight in it.

That brings us to the matter of cutting down weight. It is done only by scrupulous attention to details; the bush-walker with an ultra light-weight outfit doesn't carry a single buckle on his gear if a little leather lace will do; no steel or tin if aluminium will serve the same purpose; and no heavy canvas if he can get a lighter material. The Australian soldier carried on his pack, haversack, belt and other equipment exactly thirteen and a half ounces of solid brass in the form of buckles, tags, clips etc. If those same fittings are made of aircraft alloy there is no loss of strength or efficiency but the total weight is six ounces. The Army clasp-knife weighs five ounces; replace its metal sides with plastic and the weight is reduced by half. Our waterbottles of enamelled sheet iron were just twice as heavy as the aluminium ones

carried by the Americans. In those few items alone over a pound of useless dead-weight could be eliminated. That is what the bushwalker does with everything he has to carry; he does not even have any pennies in his pockets. As a result, he doesn't carry as much as an ounce of dead-weight, yet lacks nothing which he really needs on the trip.

In the matter of food he copies the American Indians and cuts down weight by dehydrating everything that can have water taken out of it and adding water to it again when needed. When forced to travel fast and far the Indian took nothing save his bow, a quiver of arrows and a bag of parched corn or pinole (pronounced "pin-oh-lay"). If he could secure no other food he added water to a handful of the corn and made it into porridge. By dehydrating you can cut down the weight of the food you carry to two pounds per day. Of course, it must be concentrated nourishment also; everything must be high in food value—honey rather than jam.

Two items do not appear in any Australian handbooks I have read, however. They are biltong for the hot weather and pemmican for the cold. To make the former, get some prime lean steak and trim off all fat. It should be purchased on the evening before a hot day with a strong wind. Next morning cut the steak into thin strips, dip for a second into boiling brine, and then hang over wires in the sun and wind. The strips will dry into what look like bits of old leather in a few hours. When quite dry, store in cloth bags which must also be kept dry. Biltong remains good for a long time. Before use, soak it for a time in water and then fry, grill, or use in a stew. To make pemmican, cut any lean mutton or beef into very thin slices; place on wire-netting (fine mesh) in the sun and wind to dry thoroughly. Render the fat from some clean mutton or beef suet. When your meat has dried into thin chips pack it tightly into a tin, pour the melted fat over it and set it aside to cool before putting the lid on. When any of the contents are used pour some melted fat back

to seal the surface again. Pemmican is best used made into hoosh by adding water, dehydrated potatoes, pea-flour, rice, barley, macaroni or anything else, and letting it simmer until it is a thick, rich soup.

Silk or japara bags are the best means of carrying all dry foods in southern Australia, but in the humidity of the tropics the moulds soon render food useless if carried in this way. We got over this trouble by packing everything into square mustard tins with screw caps soldered on them. It added a bit to the weight of the pack but our food didn't spoil. Before use such containers had to be sterilized by dry heat and everything put into them had to be taken straight from the sealed original packet or container.

The real bushman, however, scores over everyone else in the matter of food, unless he is travelling over country with few or no natural food resources. He needs to carry little besides wholemeal self-raising flour for dampers, butter, salt, tea and sugar. Flour and butter are taken because bread and butter are the two items of civilized food which you miss most when living off the country and nothing takes their place. All the rest of his food he picks up by the use of the tricks mentioned in this book.

One man whom I met in north Queensland was so good at this sort of thing that he made my best efforts seem like those of a raw new chum by contrast. He would spend a month at a time in the scrub, prospecting in areas like the wild country at the head of the Daintree, and he carried only eight pounds of foodstuffs. Yet, he said that he lived on the fat of the land. It must be admitted that natural foods are abundant in that country, but the performance is remarkable for all that. I spent a day with him; this was our menu: breakfast, grilled fish and baked yam; lunch, roasted water-chestnut and freshwater crayfish; dinner, baked jungle fowl and palm heart, with bopple nuts for dessert. Each day

he spent an average of one and a half hours in food hunting and in making and setting snares etc.

You must carry with you some form of cutting and digging implement. Some swear by the American hunter's hatchet, but the universal bush implement is the machete or jungle knife. The best type is twenty inches long with a broad tip to the blade. With it you can slash, chop as with a hatchet, and dig as with a small shovel. Do not buy at an Army surplus store one of those thick-bladed, ill-balanced atrocities which were made in Australia; try to get a good one. American-made ones aren't bad, but the best we ever saw in the Army were made in Sheffield by Joseph Beale and Sons. They were a real cutler's job.

There is an art in using the machete. The cutting edge runs across the almost square tip; that is kept blunt and is the digging edge. For six inches back from the tip it should have the keenest edge you can give it; that is for cutting grass, slashing away undergrowth, bark-cutting and similar work. From this part back to the handle the edge is more obtuse and axe-like; that is for chopping dead or hard wood. When using a machete always cut on the slant and never chop straight into the grain. Sharpen it with a vest-pocket carborundum stone. One such tool will supply the needs of a fairly large party.

There are a few warnings that should be given. Don't trust the cutting implement to everyone, because some people can't manage tools and they gap the edge or break the blade of anything they handle. Give lessons in the use of the machete to the most capable and insist that they alone carry out any jobs that have to be done.

You are often advised to cut down the handle of your frying-pan to make it easier to pack, and to push a stick into the socket formed when the handle was sawn off. As far as my experience goes, this causes more dinners to be tipped into the fire or on the ground than anything else in camp.

Heat shrinks the wood in the metal and the pan falls off when you try to lift it. It is far better to have a screw-on handle.

Don't listen to what the man behind the counter has to say when buying your gear, unless he happens to be an expert himself like Pallin. Follow the advice of the New South Wales Federation of Bushwalking Clubs when getting an outfit together; they give advice founded on years of hard experience. The salesman may never have taken a bushwalking trip in his life.

No matter how you have to economize, buy good walking boots. If you can get kangaroo or wallaby hide be willing to pay double the price of an ordinary boot. During the war American Army tests proved what all mountain climbers already knew—that to take one pound off the weight of a pair of boots was equivalent to taking five or six pounds off the weight of your pack. Kangaroo or wallaby hide uppers make the lightest yet toughest boot.

Don't leave the first-aid outfit behind, even if you are only taking a short stroll from the main camp.

CHAPTER XV

THE FINAL WORD

There is no real harm in doing a little day-dreaming before facing the hard realities; let us indulge in some wishful thinking.

The fundamentals of bushcraft could be taught in the schools, for a knowledge of our bush and its ways should be part of the birthright of every Australian child. Later, in the high schools, students who show aptitude for the work could be given the chance to make a more thorough study of the subject, especially those who seek careers in the police force, forestry, agricultural science, surveying, soil conservation or the armed forces. In addition to gaining a fund of useful information, the student would have his powers of observation and his initiative developed to the utmost. A love of Nature would be encouraged and a hatred of senseless destruction of flora and fauna.

People whose schooldays are over should be given the chance to learn bushcraft in summer camp schools, as part of adult education schemes. It should form the basis of Girl Guide and Boy Scout training. There can be no doubt of its popularity among most of those to whom it would be taught. But that is the dream; here are the realities.

The education departments *have* been approached. They all admit it to be a good idea, but state that the curriculum is now so crowded that there is no room for fresh subjects. Attempts have been made to teach bushcraft to adults, but

it was found that only lectures could be given, in spite of protests that it is not a subject for the lecture-room. All fears were confirmed when it was found that the lectures were attended chiefly by that numerous class of people who like to hear other people talking about their experiences, but who never think of going off to gain experiences of their own. I have since declined every invitation to give a talk and shall do so in future.

In the Army I was often approached by men who would say, "I'm a Scoutmaster in civil life and this is just what we need for our boys. Is there any chance of you doing something for us after the war?" I promised to do what I could, and one of the first things I did, following my demobilization just before Christmas, 1945, was to offer my services to the Scouts. The offer was repeated on two subsequent occasions. In every case it was declined on the ground that there was no room for it in the already crowded Scout training programme. The Girl Guides did want it, but in nearly all cases only in the form of lectures.

There are many subjects which can be taught by talking about them, but bushcraft isn't one. Just as you have to go into the water to learn to swim, so you have to go out into the bush to learn its ways, with very little talking but a great deal of demonstration and practical work. Unfortunately, many leaders of very worthwhile organizations do not seem to be able to grasp this point, and until they do we shall get nowhere.

This handbook may inspire some people to take up the study of bushcraft; they will naturally want to know what can be done. To them I offer this advice: since it seems impossible to get somebody to give a lead, we shall have to do our own leading and not wait to follow somebody else.

There is one opening: in Australia there is a large and ever-growing body of men and women who are definitely interested in this type of study; they are the members of our

bushwalking clubs. Sydney has thousands of them on the rolls of the Federation, Melbourne a lesser number, and there are also clubs in Adelaide, Launceston and Hobart. If you live in or near any of those cities and can measure up to the high standard which those clubs demand from members, a standard based not upon social standing or affluence, but solely upon a reasonable standard of physical fitness combined with a love of nature and—most important qualification of all—the right temperament, you are eligible for membership. Join one of those clubs if you can. If you would like to form a club of your own, any existing club or the Federation of Bushwalking Clubs will help you in any way that lies within their power. If you can't do either of the above, take this handbook as a guide and, either alone or in company with a friend or two, set out to make yourself a good bushman.

Be sure that you master each step thoroughly; as you gain in skill and experience pass your knowledge on to others, especially the youngsters. Always make practical work take precedence over theory in your tuition and do not make that fatal error of talking about things which you haven't tried out for yourself. People usually want to be *shown* the things of which you speak, and without practical experience, as surely as the sun will rise tomorrow, will you lay yourself open to the humiliation of failing to demonstrate before an audience.

You will find plenty of room for your work among the youngsters in our cities and larger towns. Eighty per cent of them, on the average, cannot distinguish one species of gum-tree from another; most of them cannot distinguish by name more than a few of our commoner species of native birds. Take them into the bush for an outing and you will find that most of them know so little about the plants and animals of their own country that they are like people in a library who cannot read. It is your job to hand them the key which will

enable them to start reading Nature's endless story at first hand.

You will find just as many willing pupils among adults as among the youngsters.

At all times you must observe the bushwalker's code. You leave no litter at your camp-sites, no vegetation is needlessly destroyed, no harmless creatures are wantonly killed. At all times you are ready to act as an unofficial but enthusiastic protector of flora and fauna; your parties are never rowdy, nor do the members ever appear in freakish costumes. Plain khaki, grey or jungle green are the colours you wear; all fancy dress is left to the hikers, between whom and bush-walkers there is a great gulf. Above everything else, you take no risks with *fire*. Live up to that simple code and the people who live in the bush will soon offer you a welcome.

Do not worry about undesirables wanting to become bush-walkers. Bushwalking does not attract the type of vandal who disfigures beautiful old trees by carving names on the bark, nor the type who cut down the palm which had been growing for thousands of years on Tambourine Mountain in Queens-land. It holds no attraction for wealthy but brainless young men and women like those who landed from a yacht on an island off the South Australian coast and had a fight with the eggs of the rare and beautiful sea-birds which nest there—an occurrence which brought blistering comments from that great nature lover, Professor Wood-Jones.

If you form a club or a study group and have no previous experience in directing such a venture, remember that to the onlooker who has never tried his hand at the job, leadership seems a simple task; those who have done it know that it is the hardest of all things to do properly. To a certain extent it is a gift; some people naturally assume command and others look to them for guidance. Often, however, those without this gift find themselves forced to act as leaders.

If you find yourself in such a position, be prepared to work twice as hard as anyone else, to put your own comfort last, to regulate the pace of the party to the slowest ones rather than the fastest, and to remember that all parties have a tail as well as a head. Appoint a deputy to be the last man; his job is to see that the tail end isn't left behind, to wait for stragglers or those who fall out. At every halt you must run your eye over the party to see that everyone is there.

Sooner or later all leaders meet a grumbler. First make a point of explaining everything to him, or her, since many complaints are due to the fact that some leaders neglect to explain why something is being done. If the grousing still persists, select that particular person to take a turn at leading, including the preliminary planning of a trip. In that way you *may* discover somebody with a priceless gift for organization and leadership. Probably, however, you will unmask a fine specimen of the type of critic who expects others to do what he cannot do himself.

As the bushwalkers' ranks are augmented by new members, there will be more and more of us to make ourselves heard when we urge that additional areas of our bush country be set aside as national parks or scenic reserves, more of us to police existing reserves and bring vandals to book, more to see that the game and fishery laws are observed, to aid in preventing bushfires and to save our native plants and animals from extinction. Once such a movement gains sufficient momentum, things will begin to happen almost automatically. Education departments may begin to think that children should be taught more about their own country and be shown how to look after themselves in the bush; greater numbers of people may stop watching organized sports and gambling on the racecourses in favour of an activity in which they take part. We may even see a distinctly Australian programme of training for our Scouts and Guides, based more

upon what future citizens of this country need and less upon what has proved suitable in Britain.

Those who take up bushwalking as their recreation, with a study of bushcraft as a hobby, find that they have much to gain and little to lose. It does not, it cannot, appeal to more than a certain percentage of the population, but to those who do like it, the attraction does not lessen but increases with the passing years. You can go on to specialize in any form of nature study which appeals to you; there is always something new to hold your interest.

It must not be thought that it is all fun and always fun; far from it. At times you will know discomforts and sometimes downright hardships; you may learn by experience just what is meant by the bush term "doing a perish", you may have to cross a dry stage, be lost in a mountain fog or be stormbound in a hut, cave or tiny pup-tent. You will know the searing heat of the duststorm and the icy blasts of the sleet-laden southerly gale. But it is those very things which bring the greatest compensations.

Did ever a billy of tea taste better than one brewed after crossing a dry stage? Was fire ever more welcome than when, after battling the gale for miles along the ridges, you were at last able to descend into a sheltered valley and make your camp? Did you ever feel more like becoming a sun-worshipper than when the rain at last eased off, the clouds broke, and the sun streamed on a world washed by days of rain? Experiences like these make you appreciate fully the really good things of life; only by going out and risking discomforts can you accumulate the most imperishable treasure of all—a store of happy memories.

You will also learn what is meant by the term "comradeship", for there is no friendship like that of the bush track or the open road. Bushwalking is the cheapest way of taking a holiday and we have a whole continent in which to roam; a country where you can find almost anything which the

rest of the world can offer. Do you want to drift in a canoe down a great river? The Murray is there for you to use. Do you want to visit snowfields greater in extent than those of Switzerland? You can find them in our snow country every winter. Would you like to bask under a midwinter sun, shining day after day from a cloudless sky? You'll find it in north Queensland. Tropic islands set in sapphire seas? There are hundreds of them on the Barrier Reef. Would you like to see the most glorious show of wildflowers in the world? Visit Western Australia in early spring.

To some people wanderlust is but another word in the dictionary. To others it is something real and tangible; an often gratified yet never satisfied urge to see what lies beyond the horizon's rim. To these people bushwalking can mean the attainment of an ambition. For bushwalkers do have a chance to see the sun rising behind distant ranges, the glowing colours of a desert sunset, the palms bending before the rush of the trade winds, the towering cloud ramparts of a thunderstorm gathering over the mountains, the lonely beaches and thundering surf of our southern coasts—all the things for which many others sigh in vain.

Scents can recall memories sharply, and, to one who has roamed a continent, what happy memories! A woman sits beside you in a city tram; you catch a whiff of perfume, and your mind leaps to a hillside in Western Australia covered with boronia in bloom. You pass a park where the gardeners are burning off, you smell the smoke, and you are back again in memory at the spot on the Murray where you made your camp-fire of sweet-smelling native pine twigs. Smell new-watered gardens in a suburban street on a warm night, and you are back in the tropics again.

Sounds can also awaken memories. A puff of wind sighs through the branches of a pine-tree and you find yourself thinking again of a night under the brilliant stars, when you lay under a clump of desert oaks and listened to the wind

drawing soft music from the wiry twigs above your head. It is at such times that you go home to overhaul your rucksack and other gear, that you look at the calendar and long for the time when you can go bush again.

Finally, we must realize the value of a sound knowledge of bushcraft in the defence of Australia. A few brief years ago we faced the prospect of invasion by a brutal enemy. No matter what new and dreadful instruments of destruction are invented, warfare always seems, in the end, to come down to a battle on the ground between soldiers. If ever this country faces invasion again, the man who can play a major part in its defence is a good bushman with a rifle in his hands.